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SERVING ALL INDUSTRY

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AP1-15



AFTER BUSINESS HOURS

They called them Shillibeers . . .

. . . but not for long. The Cockney soon changed the name to 'bus'. In this article, Charles F. Klapper traces the development of passenger road vehicles and considers their future role in the general transport plan.

SO efficiently and unobtrusively does road passenger transport carry out its task that the general public rarely gives it a thought until some minor failure throws its customary regularity into bold relief. This is a tribute to two parties: to the operators and the skill with which they deploy their resources to handle traffic adequately; and no less to the engineers, whether they be concerned with vehicle maintenance or with the design and manufacture of mechanical units and bodywork. British engineers have a remarkable number of achievements to their credit in the modern development of the public service vehicle.

How well they have succeeded in providing attractive service, in

conjunction with the traffic facilities offered by the various operators, may perhaps be gathered from the fact that in Great Britain there are some 66,000 buses and coaches, serving a population of roundly fifty millions, whereas in the United States, with its vastly greater area, 50,000 regular service buses suffice for a population of 130,000,000. It should not be overlooked, of course, that there are also about 30,000 special school buses in the U.S.A., with much larger stocks of trams (or street-cars) than the 1,500 now remaining in the United Kingdom, while the trolley-bus fleets are about the same in both countries—between four and five thousand. The much higher proportion of motor cars per head of

population in the U.S. naturally reduces the facilities which it is economic to provide for the public.

It would, indeed, be hard to find another area in the world where so dense a network of inter-urban bus services is provided as between Land's End and John o'Groats, Barmouth and Yarmouth. This network has developed in a comparatively short space of time. Although buses of sorts were operated by Blaise Pascal—the inventor of the calculating machine—in Paris early in 1662, there was a pause until Lafitte initiated a successful service in that city in 1819. Within a decade one, Baudry, had invented the name omnibus, which stuck, and George Shillibeer, a young English coachbuilder, had imported into the Metropolis, the idea of plying for hire along the city streets, without prebooking, fleetname and all. True, there was a tendency to call them shillibeers with a small s, but that was scotched when their originator went into the undertaking business, and the Cockney quickly came round to the simple 'bus'. Their success was such that legislation was passed to regulate them as early as 1832 and to that Act we owe the standard seat width dimension of 16 in. per person.

From 1833 to 1840, when turnpike tolls killed them, there were actually steam buses on the Moorgate-Paddington route. In 1851 the Great Exhibition brought about the development on an extensive scale of the double-deck horse bus.

The bus became mechanized some time after the first electric trams ran at Blackpool in 1884 and at Leeds in 1891. The first regular service by petrol vehicles began in Edinburgh in 1898 and it was not until 1904 that Thomas Tilling, Limited, had the courage to motorize an entire horse bus service in the Metropolis. Real development of motor buses on satisfactory financial lines did not begin until after the introduction of less heavy vehicles to meet the stringent Metropolitan Police regulations of 1909.

From then on services rapidly developed, sometimes in towns without tramways—Eastbourne Corporation started a bus service in 1903—but also to reach out-

lying villages and to form inter-urban connections. The development continued despite the war of 1914-18, and by the late 'twenties no large area was without an operating company already well established. Townspeople could now reach the country, new life was infused into the countryside by putting every hamlet in touch with a good shopping centre and within reach of a cinema performance. These facilities have changed the social life of England more profoundly than revolutionary changes of government have affected less stable countries.

In supplying the means to operate these services, the British bus chassis manufacturer and body builder, says the author in "Vickers Overseas News", have gained unique experience. Leaving on one side for the moment all the export lessons of the past forty-five years, the satisfaction of home demand ranges from the most intense bus and trolley-bus traffic in the world on the streets of London and its sprawling suburbs, to the single-track roughly-surfaced roads of Skye and the Outer Hebrides. The buses deal with thousands in a few minutes as they are disgorged from the factories of Birmingham, Leeds or Manchester. They are on the spot for the night shifts at the pitheads, running to and from their garages in the small hours. They give a comfortable ride to women shoppers, whether they are bound for the Bull Ring, Birmingham, or Princes Street, Edinburgh.

There is hardly any limit to the variations of physical conditions. There are busy Fenland roads, just wide enough for two vehicles to pass, where a steering failure would give the passengers a good chance of a wetting in a deep dyke; there are the pot-holed cobbled streets of the Lancashire towns; there are long gruelling climbs across the backbone of England, covered many times a day on the interurban runs between Lancashire and Yorkshire, with high spots such as Axe Edge between Leek and Buxton or the Snake between Manchester and Sheffield. In Upper Teesdale, on the Middleton-Alston road, the Teesdale Queen bus may be seen turning about to serve a small

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Right on London's doorstep there are bus routes at Westerham and Caterham on hills which have short stretches of 1 in 6; in South Wales and Monmouthshire there is a gradient of 1 in 5 on the Thornhill route up Caerphilly Mountain and 1 in 41 on the loose macadam of the bank between Bargoed and Aberbargoed. We well know fearsome hairpin bends on roads as far apart as Boscawen in Cornwall and Foyers in Inverness-shire.

The engineers have produced buses of special designs to deal with all sorts of obstacles, such as the low railway bridges or culverts found in York and Stoke-on-Trent, which call for low-built single-deckers. There are ancient city gateways to negotiate, one of which, Beverley Bar, has brought about a special contour for the roofs of East Yorkshire double-deck buses, and the modern tunnels such as Blackwall under the Thames, which is just too small for a full-height covered double-decker.

Hardly a problem has not come somebody's way—a special layout of body, perhaps, to meet some peculiar traffic circumstance or a special gear ratio to cope with steep grades or long high-speed coach runs. The very limitations on road vehicle dimensions that have so irked British operators have also, to some degree, produced ingenious designs, compact yet sound, that might

never have been devised had more space been available.

A wealth of knowledge can also be brought to the aid of the operator overseas, whether he is engaged in service in humid tropical forests or in dusty desert country. On the railways, it must be remembered, British engineers pioneered first timber and later steel coaches for service under these conditions many years before roads were built. British buses have done well in the summer heat and winter snows of Canada, just as they stand up to work in India, or tropical Africa and South America. For bodywork alone to stand up to such extremes of climate, particularly the effects of condensation—in cold or hot countries—is a triumph for the designer and the craftsman. Then again, diverse national characteristics inspire diversity of design requirements.

In Canada the so-called transit-type bus is popular. It is specially designed for one-man operation of the largest possible single-deckers. The flat fare system in cities makes this possible without loss of scheduled speed. In South America the keynote is luxury in seat design and external decoration in chromium, with rows of red lights fore and aft as a distinguishing feature. South American cities are the home of the collective, a small bus of from 8 to 16 seats, serving light traffic routes and almost giving a cheap taxi service.

Throughout Africa the provision of two classes of accommodation,

for African and European passengers, is a headache. In South African cities, as in those of Australia, the double-decker is preferred, but on long feeder routes to the railways or for service in the more remote districts the single-decker may have a large freight compartment or even an open truck body behind a row or two of seats. Australia still places great reliance on the tram, especially in Brisbane, Sydney and Melbourne, although Sydney is now ordering large fleets of long-wheelbase single-deckers. Some 46-seaters on chassis of 34 ft. 9 in. overall length are in commission. Melbourne, however, having replaced certain cable tram routes by buses, is now proposing to return to electric tramsways on some of them. In the outback, some railway services have been replaced by buses, usually orthodox single-deckers, although large articulated single-deckers are used on certain country routes.

Denmark favours the 80-seat articulated unit and also has some buses hauling passenger-carrying trailers; in Holland, long wheelbase 45-seat four-wheelers built in Britain have carried a great burden of transport since the war. One batch for long-distance service was specified to be capable of sustaining speeds of the order of 60 m.p.h. Indeed a colleague, testing this supercharged diesel chassis on an English main road, succeeded in reaching 74 m.p.h. before prudence compelled him to lift his foot from the accelerator.

To the English eye, perhaps the most striking feature of many Continental passenger vehicles—particularly the touring coach—is the bizarre shape of the bodywork and its elaborate decoration.

India, Pakistan and Ceylon have imported many orthodox British vehicles, some, however, having noticeable departures from home design in the way of louvres for ventilation, anti-glare glass, and purdah compartments. When bodywork is built locally a distinctive type of vehicle results. China again tends to the orthodox in its imports, 70-seat four-wheel buses having gone to Shanghai not so long ago, but bodywork built in China is of an easily recognised architectural style.

What is the future of the struggle between the bus and trolley-bus and other forms of transport, such as the tram on city streets, and also the railway? It would be foolish to assume sudden changes to be inevitable, but slowly and surely the bus and coach are advancing and where they are permitted by official regulation, providing speedy and comfortable transport.

An interesting tendency, almost unthinkable a decade or so ago, is the displacement of railways by road vehicles, especially where the population is thinly spread and distances are comparatively short. In Ireland, the Ulster Transport Authority is rap-

(Turn to page 58.)

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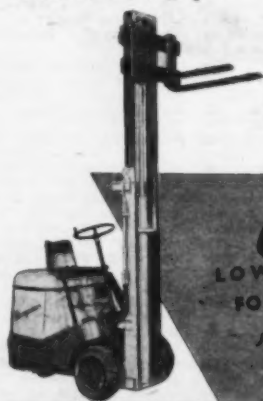
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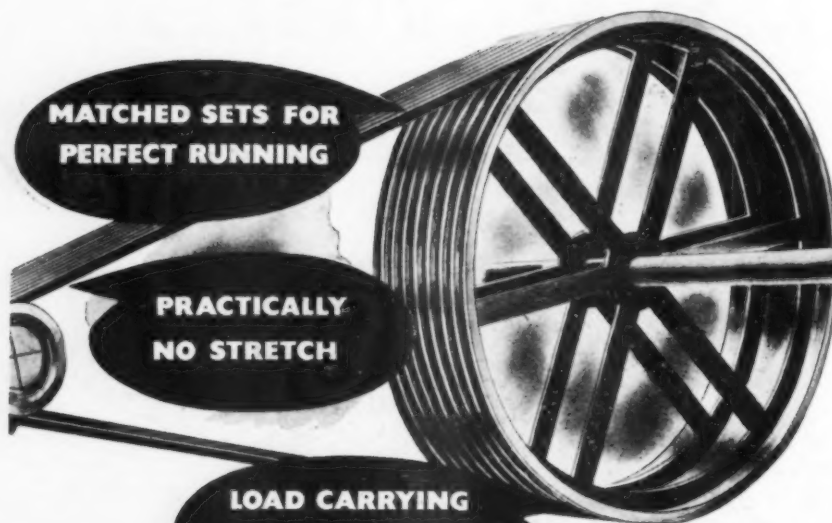
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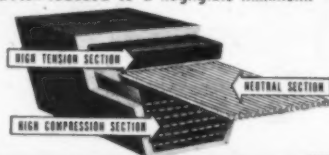


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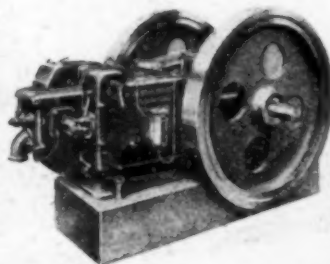
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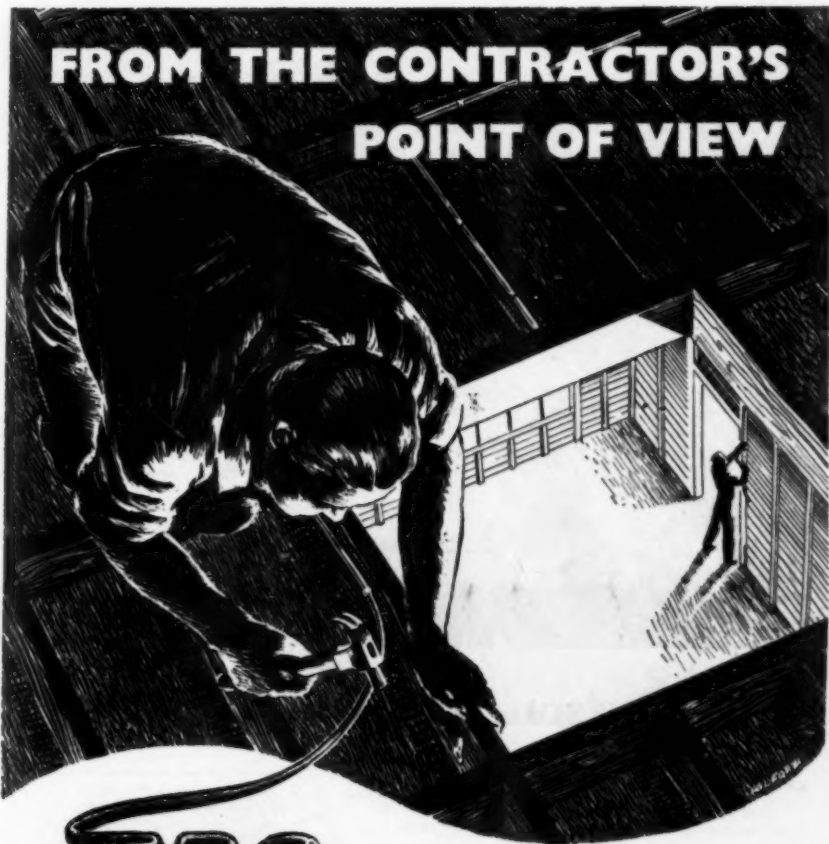
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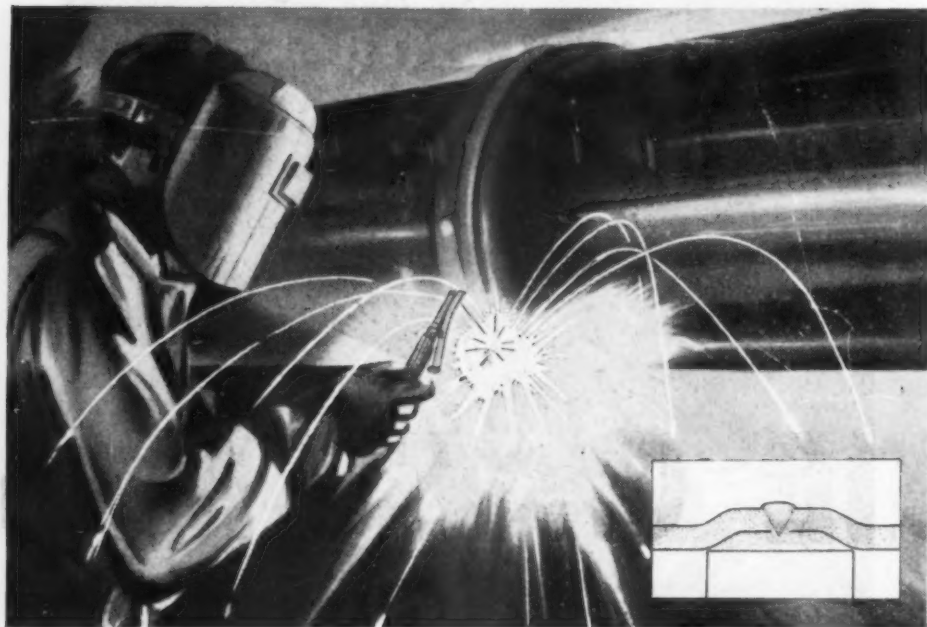
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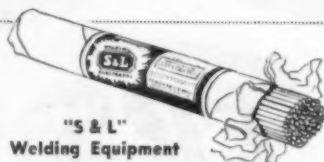


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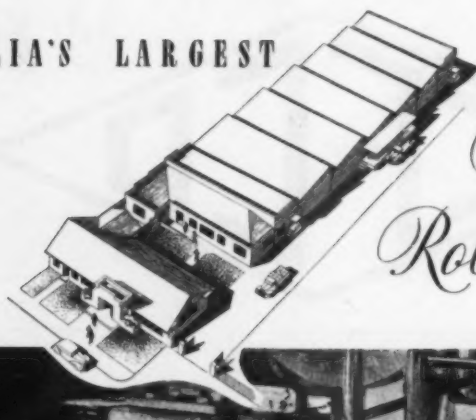
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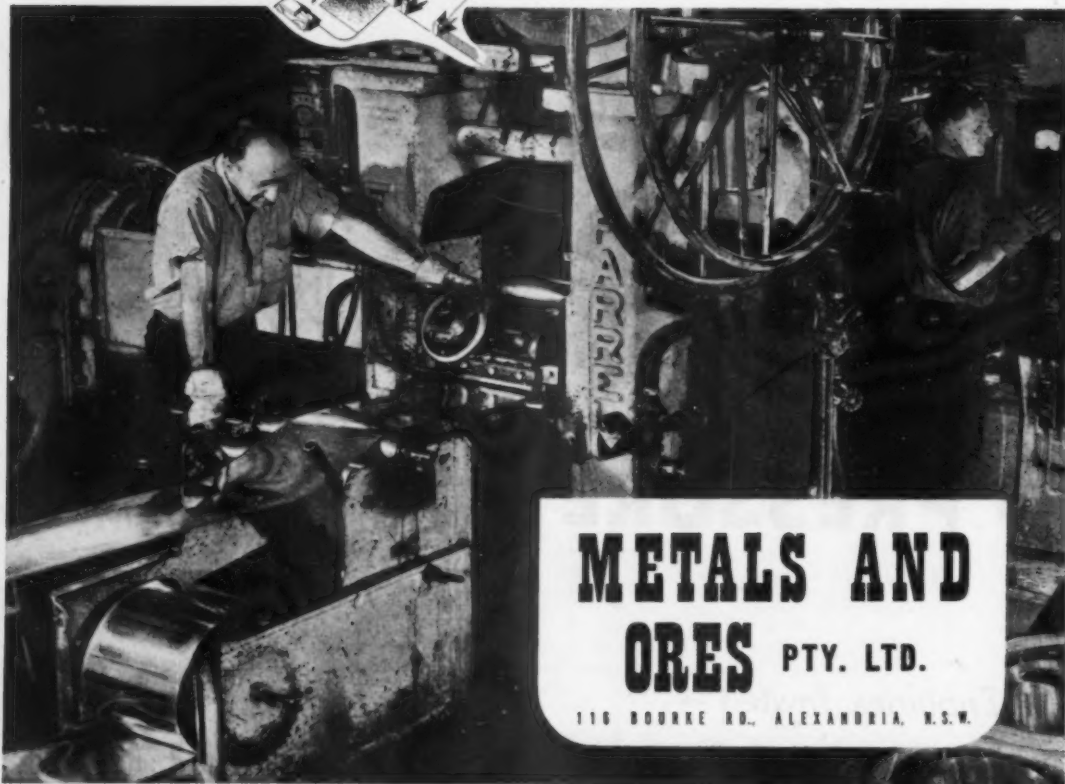
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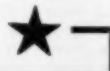
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PAGE FIFTEEN OCTOBER 14, 1950.



No Revaluation of the £ Australian Vital Decision by the Commonwealth Government

Statesmen in every nation to-day are endeavouring to cope with the question of inflation. Various schools of thought are advancing various remedies. The spiral of costs and prices, meanwhile, soars persistently and dangerously upwards. The issue, indeed, has become so menacing in character and constitutes so serious a threat to the balance of the economy that drastic steps either have been taken, or are contemplated, by most of the leading nations.

AUSTRALIA, in common with the rest of the world, is confronted by the inflation problem. Her statesmen, accordingly, are watching the situation with the utmost vigilance, weighing the pros and cons of the different remedies advanced, and seeking a solution calculated to inflict the least loss and harm to the lowest possible number of her people.

The remedy most consistently put forward is the lifting of the £Australian to parity with the £British.

It will be recalled that in the dark depression days of 1931, Australia devalued her pound 25 per cent. in order that she might help her primary producers, the prices of whose products had fallen to unbelievably low levels. This means that Australia receives £125 for every £100 worth of goods she exports, paying, at the same time, £125 for every £100 worth of goods imported.

Obviously, this has proved a great boon to the man on the land, being—as was intended—the weapon wherewith he fought his battle against depression prices.

It has been claimed in certain quarters that this situation means manufacturing industries are getting the double protection of the tariff and of the Exchange rate. The fallacy of this claim is exposed in the following statement of Mr. Alan R. Browne, President of the Metal Trades Employers' Association.

"In 1933," he said recently, "the Tariff Board held a public inquiry into the effect of Exchange rates in relation to the tariff, and later tariff rates were reduced by one quarter. Since then Australian manufacturers have received only the same effective protection as they received before the devaluation of the £Australian in 1931. Since 1933, it has been the practice of the Tariff Board to take into account the protective effect of Exchange rates when recommending new tariff rates. To appreciate the £Australian now would be equivalent to drastically cutting tariff rates. If the action taken in 1933 could be reversed and the loss of Exchange protection restored by means of the tariff, where it is

justified, no serious objections to appreciation would be raised by Australian manufacturers. Unfortunately, Australia's acceptance of the General Agreement on Tariffs and Trade destroys our freedom to do so, because the Agreement provides for the pegging of tariff rates for three years."

It is all too plain, therefore, that revaluation under to-day's circumstances would be tantamount to a 25 per cent. reduction in existing protective duties. This is a proposition which must not be entertained for a moment, particularly at the present juncture when the manufacturing industries of this country stand in imminent peril of further tariff reductions, following the recent conference at Torquay, England, of the signatories to the International Agreement on Tariffs and Trade. Any such subsequent reductions, coupled with the 25 per cent. loss which would follow in the train of revaluation, would make difficult, nay, impossible, the meeting of the keen blasts of competition destined to blow in from abroad.

True, secondary industries stand to gain certain advantages from a revalued £Australian, notably by way of reduced prices of imported raw materials and of imported capital equipment. In 1948-49, both of these items were of considerable proportions—£162,000,000 for raw materials and £41,000,000 for capital equipment. This means that under revaluation, the machines and machine tools imported from overseas for use in Australian factories and engineering plants, would cost industrialists some £19,000,000 less than they cost under existing Exchange rates. During 1948-49, moreover, Australia imported fuels and lubricants valued at £36,000,000; building materials at £14,000,000; materials for primary producers at £14,000,000; and other factory requisites at £26,000,000. The revaluation of the £Australian would effect a saving of £16,000,000 on these items. The stern fact remains, however, that, by and large, the savings effected would by no means compensate the manufacturing industries for the measure of Protection of which revaluation would rob them.

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The acting President of the New South Wales Chamber of Manufactures, Mr. Parry-Okeden, made a number of interesting points when discussing the inflation question during the past week. "The current inflation—if that is the correct term—is," he said, "basically the result of an inadequate supply of consumer goods to match the increased spending power of the community. The Chamber of Manufactures believes that the cure is to increase the supply, rather than to reduce the spending power. Let the Commonwealth Government tackle, and remove, the bottle-necks to production—shortage of coal, the Communist disruptionists, inadequate transport facilities, and the excessive absorption of manpower in Government employ—and the real cost of living will fall without recourse to an artificial currency juggle whose gains are illusory, and whose losses are obvious." The taking of the practical steps here outlined undoubtedly could go far towards solving many of Australia's problems, notably the inflation problem.

Admittedly, this nation faces a serious situation. Costs are rising and there is nation-wide competition for such manpower and materials as are available. Add to these the record peacetime expenditure of defence; the colossal sums incidental to the carrying out of the vast immigration programme; the implementation of the huge national projects of the character of the Snowy River Hydro-electric Scheme, with their urgent demand for men and materials; the high level of social service expenditure; and the prospect of £70 million being paid as war gratuities next year, and there emerges a national financial position so complex and

so inherently dangerous in character that its handling calls for consummate skill, consummate vision, and consummate wisdom.

Such burdens as are essential to its rectification must, however, be borne equally by every section of the community. The proposition that Protective duties should, in one fell swoop, be reduced by 25 per cent. is a proposition which would strike a blow at the manufacturing industries just at the time when their progress and expansion are basically essential to the successful implementation of the immigration programme.

For the all-important fact must be borne well in mind that, under the terms of the International Agreement on Tariffs and Trade, Australia's hands are bound and fettered. For had her industries been robbed by revaluation of 25 per cent. Protective duties, she would be powerless to make good the loss—a loss which would strike at the very foundations of her present progress and development and of her future security.

Fortunately for Australia, her Prime Minister, Mr. Menzies, has decided that his Government shall not devalue the £Australian. Rather has a comprehensive plan been drawn up to grapple with the inflation problem, the main points of this plan being: (1) Control of basic materials; (2) taxing of excess profits; control of capital issues and bank credit; (3) heavy tax on luxury goods; subsidies on some food for measures to curb inflation through the high wool prices; and (5) cuts in public works. The significance of this plan rests on the fact that to its implementation, every section of the Australian community will make vital contribution.

Pithy Jottings of Industry and Industrialists

DIRECTORY OF INDUSTRIAL LIBRARIES.

The Special Libraries Group of the Library Association of Australia is revising its directory of the special libraries in N.S.W. Any library which has not previously been listed, or where there has been a change of librarian, is asked to get in touch with Miss A. Culey, Librarian, McMaster Animal Health Laboratory, Parramatta Road, Glebe, N.S.W. 'Phones: MW 1600 and MW 1602.

MORNINGTON "IDEAL FOR INDUSTRY."

Mornington Peninsula in Victoria is an ideal location for the establishment of industries.

It is felt if the Victorian State Government decides to prevent additional building of factories in the Melbourne metropolitan area, attention should be paid to areas such as Languarinn, Clibb Point, and on the outskirts of Mornington.

There is plenty of land, especially in the Westernport locality. At Languarinn, the old military camp land of many acres would be ideal for a big factory scheme. The land abuts the railway.

Many inquiries have been made by representatives of Melbourne firms about buildings and land. But no buildings are available in the Mornington area. Factories would have to be built.

£2,500,000 CONTRACT FOR LOCOMOTIVES."

It has been announced that the Department of Railways, New South Wales, has placed an order with Australian General Electric Pty. Ltd. for forty 1,500 volt. D.C. electric locomotives at a total price of £2,547,751.

These locomotives, which will be the most powerful of their kind in Australia, are required for use on the Sydney-Lithgow line, which is to be electrified in the near future.

The order was received by A.G.E. despite keen competition

from firms in Sweden, Italy, Switzerland, France, Germany, Japan, Austria and England.

Each locomotive, weighing 108 tons, will develop 3,780 H.P. from its six electric motors and is arranged so that two or more locomotives can be coupled together mechanically and controlled from the cab of the leading locomotive.

As the bulk of their work will be the hauling of heavily loaded coal trains from Lithgow to Sydney, they will be specially equipped for regenerative working when coming down the steep grades.

NEW FACTORY FOR TROJAN LIMITED.

Mr. W. T. Harris, chairman of Trojan Ltd., recently announced that the Company has acquired a ten acre site at Springvale, Victoria, to erect a new factory. He said that the Footscray factory was not large enough to permit of the Company's planned expansion in production.

The company, in common with other Australian industries, was meeting with strong overseas competition and any appreciation of the Australian pound could seriously affect sales and competitive capacity.

MECHANICAL HANDLING EXHIBITION, LONDON.

A section of vibrating tube conveyor, occupying the whole length of one of the stands, was a feature which aroused widespread interest at the recent London exhibition of mechanical handling plant.

The section was part of a 72-ft. long conveyor, one of two being supplied to a steel works for handling red-hot sinter. Each conveyor weighs approximately 23 tons and the units have been built to deal with 130 tons of material per hour through 26-inch conveyor ducts. Electrical equipment was specially designed for the job and totally enclosed and sealed against the ingress of dust. The advantages of this type of

conveyor, especially in the handling of hot and gaseous materials, highly abrasive products, or where poisonous or disagreeable dust and fumes must be excluded from the atmosphere, are being widely appreciated by engineers.

Electric vibrating tubular conveyors are part of a range of materials handling equipment manufactured by Lockers (Engineers) Ltd., of Warrington, England, whose Australian associates are Thomas Locker & Company, 324 Queen Street, Brisbane.

LARGE OUTDOOR SWITCH-GEAR ORDER.

The Australian General Electric Co.'s tender for supplying thirteen outdoor, solenoid-operated, bulk-oil, high-speed, double-break 132 kV, 2,500 MVA, Type CW400, Form WNI circuit breakers was recently accepted by the Sydney County Council.

Made by Ferguson, Pailin Ltd., Willesden, England, the circuit breakers will be provided with cylindrical tanks, oil filled bushings and incorporated self-compensated, are control chambers and resistors to dampen voltage surges. They measure approximately 27 feet by 10 feet by 18 feet high. Each tank is a welded drum, having an oil capacity of 700 gallons, the moving contacts having a travel of 24 inches.

These breakers are the first for the Sydney County Council 132 kV system, and will be used for the Homebush and Blacktown substations.

INTERNATIONAL TRADE FAIR FOR AUSTRALIA?

A suggestion that an international trade fair be held in Australia will be made to the S.A. Chamber of Manufactures by Mr. Neil Hopkins, who is chairman of the Export Development Group, and an executive member of the Chambers of Commerce and Manufactures. On an overseas trip he was impressed by the British Industries Fair, and the International Trade Fair in Chicago.

"Trade organisations in Australia could stage an excellent exhibition which would attract buyers and tourists from the whole world," said Mr. Hopkins.

"Australia is not populated enough to hold one in each State. It should be an Australia-wide exhibition, rotating between the capitals.

"The first one should be in Adelaide, because we have experience in holding exhibitions here."

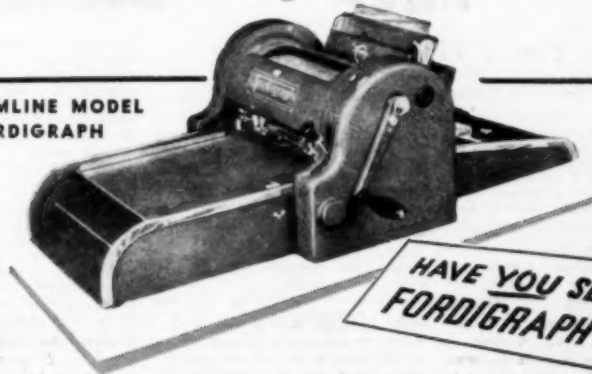
Unlimited dollars could be earned in Australia from American tourists if ship and hotel accommodation were improved to give them what they wanted here, he said.

TARIFF REDUCTION INCREASES PRICES.

British manufacturers last week raised by 2½% the price of steel fencing posts, the rise being equivalent to the duty lifted from them in July by the Federal Government.

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Our editorial representatives in each State make regular calls on manufacturers, but if YOU wish to see some particular phase of your business given publicity, communicate immediately with the Editor, and he will arrange for a representative to call.



Around & About the FACTORY

A digest of new factory and plant construction, additions, alterations and improvements, and operating news of Australian industry.



Have You a Finishing Problem?

Porcelain Enamelling for Industry

The sheet-metal working and porcelain enamelling business of E. S. & F. Ferrier, of Nth. Fitzroy, Victoria, is a typical example of the industrial progress which has recently taken place in Australia. Fifteen years ago the brothers, Messrs. Sidney J. and Frederick W. Ferrier, of Scottish extraction, arrived here from Canada and shortly afterwards commenced business manufacturing the "Chef" gas stove in a small factory in St. Kilda.

Much of the present success of the undertaking can be traced to the guidance of their father, the late Mr. Edgar Ferrier, an engineering draftsman of high calibre, one of the original partners. His transfer to the Defence Department for important work in the Navy Branch at the outbreak of the last war and subsequent death was a severe loss. Despite this setback the firm persevered, and engaging in precision sheet-metal work of high priority, quickly established itself as a reputable organisation of the highest integrity.

Thus at the close of the war the firm was in the fortunate position of having a small staff of highly skilled employees, and possession of the necessary knowledge which allowed it to make a valuable contribution toward relieving the acute shortage of consumer goods which persists to this day. To adequately carry out this policy a courageous decision was taken to purchase the spacious premises covering approximately 30,000 sq. ft. which the firm now occupies at Temperary Street, Nth. Fitzroy. About this time the partnership was extended to include several members of the family, together with a brother-in-law, Mr. Arnold Deller, whose considerable experience in finishing techniques have since been invaluable.

The wisdom of the move was soon evident and a carefully planned programme of expansion has since been largely implemented. The sheet-metal department has a wide range of modern machines, including a large panel press of 130 tons capacity, and turns out a variety of products

besides the stove parts required in the completely redesigned "Chef De Luxe" gas stoves which are one of the basic productions of the firm.

It is, however, in the porcelain enamelling section of the factory that the full benefit is discernable. Here, unhampered by lack of space, the modern all electric plant has been laid out to secure the finest quality work in the most efficient manner. Up to date methods of handling the work in progress are everywhere in evidence, and judicious use has been made of such modern devices as the photo electric cell, etc. These advantages have com-

bined to make the production of first quality enamelling much more easily attained. The capacity of the installation is such that the firm undertakes outside work, including such varied items as washing machine bodies and linings, electric irons, reflector shades, refrigerator linings, advertising signs, fluorescent troughs, electric stove parts, water heater casings and various other items too numerous to mention.

The management believes that the advantages of this relatively cheap finish, when properly applied, are not fully appreciated by many manufacturers, and cordially invites any who would like to discuss their finish problems to contact them, when they will be pleased to extend the same service which has placed them in their present position of which they are justifiably proud.

goggles and shields for airmen, railwaymen, motorists, harvesters and miners.

A typical product are the standard welding goggles. These have dark lenses made of special lightweight glass, cut to a fraction of a millimetre; cover lenses; indirect ventilation (an essential to avoid radiation); and an ingenious but simple device for adjusting the bridge. All the parts are non-corrosive and non-inflammable.

The managing director of the company, Mr. H. Dotch, emphasises that goggles, of whatever type, must be comfortable. "If they are not comfortable," he says, "the workers won't wear them."

The Tector Vista glasses, made of non-inflammable material, are useful as protection for dust in chemical works and other factories where this danger arises. The firm also makes attractively designed glasses for beach wear. Incidentally, Mr. Dotch says that the most popular colour for sunglasses this year is light green.

All the manufacturing and assembling processes are done at the Kent Street factory—from the making of the dies to the cutting of the lenses.

Hinges, Cabinet Makers' Fittings, Wheels

Warlan Products Ltd., of South Australia, are manufacturers of a comprehensive range of butt hinges and cabinet makers' fittings which have become well-known to the hardware trade throughout Australia, and are recognised as thoroughly reliable merchandise.

The butt hinges are in the following sizes:—1 in., 1½ in., 2 in., 2½ in. wide and narrow, 2½ in. butt. Other lines are playground hinges 5/8 domes of silence, table clips, roller blind brackets (nickel-plated), mirror clips (nickel-plated), and a range of pad bolts (or barrel bolts).

A. G. Mutton & Sons, also of South Australia, offers a complete range of wheels from 3 per cent. all steel to 18 in. wire spoke. The disc wheel types have been well-known in all States for some time.

Safeguards for the Eyes

Sydney Company Pioneers Industrial Goggle Production

The number of eye injuries amounts to about one-third of the total of industrial accidents.

Australian manufacturers realise the need for the best protective measures to safeguard their workers, for accidents reduce production and become costly to managements.

A committee of manufacturers, the Department of Labour, engineers and specialists has tackled this problem. Its tasks have included the fixing of standard specifications for protective devices.

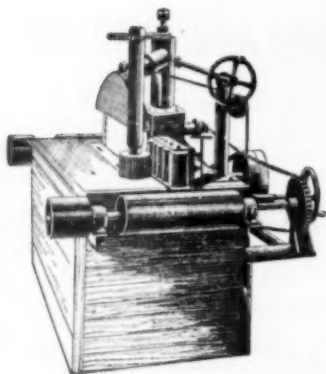
The first users of welding glasses, for instance, complained about eye-strain caused by these glasses, which at that time were not selected with proper care. Laboratory investigation showed that the coloured filters used were responsible for distortion of the light rays. Scientific principles were applied to all light-transmitting components such as lenses, filters, cover glasses and eye-shields. New standards were then drawn up for these protective goggles. These took into account visible light transmission, the transmission of ultra-violet rays, prismatic and refractive power, and freedom from optical imperfections. Nowadays goggles

have to allow for the quick replacement of lenses. They have to be strong enough to withstand the impact of flying metal particles, yet flexible and not heavy. They have to have smooth surface finishes, and must be resistant to moisture and variations in temperature.

It is important that the equipment should not irritate the skin. During the war some of the components in the substitutes for rubber had toxic effects. These are only a few of the requirements upon which the committee insists.

The Protector Goggle Pty. Ltd., of 443 Kent Street, Sydney, is manufacturing eye protective equipment to cope with industrial hazards. It began this work 11 years ago, and now, with agents in all the Australian States, produces goggles and shields which, it is claimed, equal anything which comes from overseas. These products include about 40 different types of industrial goggles to safeguard against flying particles and chips, liquids, fumes, dust and powders, radiation and spatter, glare, and flying molten metal.

"Tector" is the firm's general trade mark. They also make



QUICK-ADJUSTING NATIONAL RADIAL ARM SAW

SUITABLE FOR CASE MILLS & MEDIUM-SIZED WORK

Of all-steel construction, the National Radial Arm Saw is ideally designed for use in case mills and on medium work. In size, capacity and ease and speed of operation it is specially adapted for the job.

Saw diameter	36in. or 30in.
Shaft diameter	2in.
Speed of saw on rim	10,000 feet per minute
Height of bench	31in.
Table size	54in. x 32in.
Feed roller diameter	6in.
Flat roller diameter	6in.
Quick adjusting roller fence	
Pulley diameter	12in. x 5in. C.F. ball-bearing loose pulley.

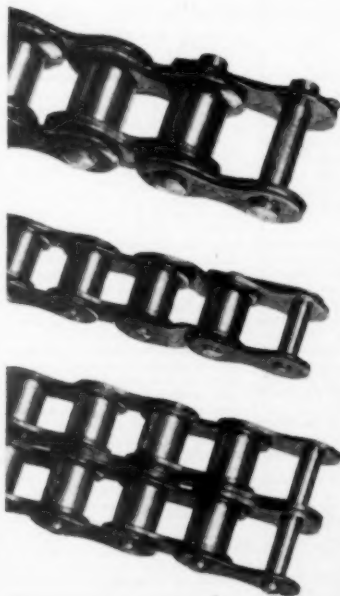
The 3-speed gear-box gives feed rates of 60ft., 75ft. and 90ft. per minute. All shafts run on ball-bearings.

For quotes and further details, apply to the manufacturers —

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White and Brennan Streets, Leichhardt, N.S.W.

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FIGURE NO 61

JOHN "SUPER" (L.S.) GLOBE VALVE
for Saturated STEAM
250 lbs. per sq. inch
WATER, OIL or AIR
150 lbs. per sq. inch.

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ILLUSTRATED above is
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Fittings for use with
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We have available, capacity on newly installed
presses for deep drawing and blanking as
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From 9" depth x 9" diameter
to 1" depth x 17" diameter

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up to 18" square
up to 100 tons

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Wire spoke types have not pre-
viously been submitted.

Two interesting items of the
range are 16 in. and 18 in. axles
which are described as being most
competitively priced.

Newly-appointed distributors for
both Warian Products Ltd., and
A. G. Mutton & Sons, are
Marshall Agencies, 146 Gawler
Place, Adelaide, and their asso-
ciates in other States.

Gas Welding and Cutting

Sydney Firm "Becomes of Age"

For 21 years, Kookaburra Pro-
ducts Pty. Ltd., of 96 Regent
Street, Redfern, N.S.W., of which
Mr. G. Hindmarsh Gazey is man-
aging director, has been produc-
ing a wide range of gas welding
and cutting plants, always keep-
ing abreast—and usually ahead—
of the latest practices and tech-
niques for low-cost equipment.

Mr. Gazey has seen the business
expand until now, on the firm's
attaining its majority, he can
proudly say that his products
have been sold to customers as
far away as Mexico, India, South
Africa, and China, and, at home,
to operators in every Australian

State. Throughout these 21
change-filled years, the firm has
made a point of fighting to keep
prices down for the benefit of the
users of oxy-welding equipment.
It has aimed successfully at giving
the welder accurate, depend-
able tools for the production of
first-class work, with a minimum
consumption of gas, reduced man-
ual fatigue, and a corresponding
increase in completed jobs. The
real cost of welding equipment
depends on its gas consumption,
its maintenance and repair. The
Kookaburra plants are designed
to operate efficiently with a mini-
mum consumption of gas. Their

simple, sturdy construction stands
up to heavy use and keeps main-
tenance and the need for repairs
down to reasonable levels. The
torches are well-balanced, with
natural grips and "easy-to-get-at"
controls. All this helps the
welder.

The firm's No. 1 high-pressure
welding plant has speed, power,
balance and minimum weight.
An improved thumb-control of the
torch valves allows quick and
easy adjustment while welding,
without the need to put the rod
down. The most sought-after
model is the No. 1A combination
high-pressure welding and cutting
plant. This has similar features
to the No. 1, but has in addition
a cutting attachment for cutting
metal up to three inches thick,
according to the nozzle used.

Both models can weld a one-
inch thickness. The equipment
for the plants includes a welding
torch with seven nozzles and
nozzle spanner star; dual gauge
oxygen regulator; dual gauge
acetylene regulator; two lengths
of three-sixteenths of an inch
welding hose; goggles, cylinder
key, torch lighter, hose connec-
tions and operating instructions.

The company's products also
include the No. 2 plant for sheet
metal welding, which can be used
for light construction work, as in
the aircraft industry, to repairs
and maintenance of cars; and the
No. 4 general cutting plant, with
high or low pressure. The acety-
lene generator is another popular
product, with many new features.

The company invites manufac-
turers to consult them regarding
any oxy-welding problem.

Aid in Shoe Industry

New Machines Help Production

A much-sought after machine in
the shoe manufacturing industry
is the Auto Soller. It is claimed
by its makers as being "the best

friend a shoemaker ever had." It
is a heavy-duty foot-powered auto-
matic soller and works at a high
speed—three nails a second.

*We specialise in the
production of*

WOODEN HANDLES
for Hand Tools, Brushes,
Toys, Kitchenware,
Rubber Stamps, also
Cores, Beads, etc.

DELTA WOODTURNING CO.

Duffy Avenue, Thornleigh, N.S.W.
Tel.: JW 3201

While it is operated by foot, it also has provision for a built-in electric motor, ready to plug in.

The machine, which has a floor space of 14 inches by 17 inches, standing like a monolith in any factory, or repair shop, is a cleverly designed machine and has numerous uses. It is claimed to be able to fasten "invisible" toe pieces rapidly and neatly. Heels are attached "in a jiffy" without hammering and no nails to handle. Invisible half soles go on quickly and the shape of the shoe is not changed. It obviates the need of a press for shanks while heel bases and back of full soles are placed firmly and swiftly.

The Auto Soller uses no nails. It employs a selected type of steel wire which undergoes a process at the manufacturing end and from this wire the machine cuts and drives its own fastener, sharp at both ends, to make a strong clinch. These fasteners are counter sunk.

It is said to be easy to learn to operate, simple to run and economical in use.

The Standard Engineering Co. Ltd., of 247 Johnston Street, Abbotsford, Melbourne, is the agent for this machine as well as other machines and plant for the shoe-making industry.

While it imports a number of machines from its parent manufacturing body at Leicester, England, the firm makes a number of units at its Melbourne works. For example, it makes presses for "cementing" soles and the complete line of plant for the Veldt-schoen system of manufacture.

The company also has an experienced staff of technicians which gives service to large manufacturers and advice on the installation of plant.

INDUSTRIALIST URGES GREATER OUTPUT.

Mr. Fred R. Burley, chairman, Berlei Ltd., Sydney, speaking at the recent annual meeting of the company, forcefully stressed the need of increased production within the Commonwealth. "Greater efficiency and greater productivity," he declared, "are the only counter to the strain imposed on Australia and Britain because of preparation against war. Some effects of the strain are likely to be shortages of material and manpower, and higher

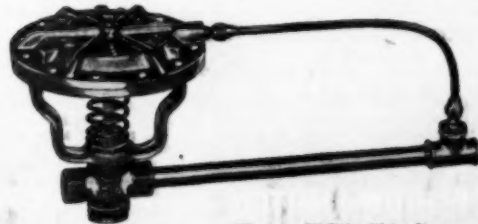
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The Wilcolator 780-C/in. water pressure reducing valve banishes old-fashioned overhead cold water feed tank.



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- Easily installed in existing homes — saves costly ceiling installation of cold water feed tank, with attendant structural alterations.

- Approved by water supply authorities in Brisbane, Sydney, Melbourne and Hobart.

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Wilcolator Electric Refrigerator Thermostats
Wilcolator Electric Range Thermostats
Wilcolator Industrial Instruments (for measurement and control)

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BRISBANE: C. F. Willers, Ryan House, 34 Eagle Street; Instrument Engineering Co., 32 Annerley Road, South Brisbane. SYDNEY: A. E. Ackland Pty. Ltd., 189 Clarence Street; Instrument Service Co., 3 Burton Street, Gisborne. MELBOURNE: A. E. Ackland Pty. Ltd., 406 Peel Office Place; Wilcolator Manufacturing Pty. Ltd., ADELAIDE: C. N. Muller, Woranda Buildings, Greatwell Street; Uebahnen & Johnstone Ltd., 58 Gawler Place. PERTH: Atkins West Aust. Ltd., 894 Hay Street.

costs and prices. There is an unsatisfied demand for the company's products, but material supply is the limiting factor in meeting it. New sources of supply are being sought, also the expansion of production with existing facilities." This vast Australian enterprise, with its British offshoot; and also factories operating in Melbourne, Vic.; Wollongong and Lithgow, New South Wales; and Wellington, New Zealand, is a splendid example of the new industrialism—with shareholdings for employees and the maximum in welfare and social amenities.

Vitreous Porcelain Enamelling

Completely Modern Continuous Furnace with Capacity

Available for Sheet Metal Enamelling

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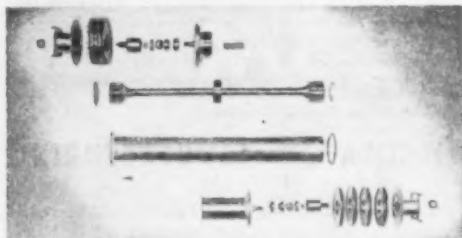


YOU WANT TO KNOW . . . and the editors will gladly tell you . . . more about the inventions, materials, and processes mentioned on this page. Write to Box 1687, G.P.O., SYDNEY, enclosing a stamped, self-addressed envelope.

Steel Accordion Makes Flexible Coupling

The universal drive shaft, illustrated, is a high-speed flexible coupling, one design of which has been operated continuously at loads up to 300 h.p., speeds up to 9,000 r.p.m., angular misalignment up to 4 deg., and variations in axial length up to 1 1/2 in. The shaft consists basically of two constant-velocity flexible joints splined to

speeds ranging from 6,600 to 9,000 r.p.m. Approximately 120 hours of the run were conducted with one end of the shaft vibrated radially at a double amplitude of 0.03 in. at frequencies ranging from 7,700 to 10,500 c.p.m. In additional tests now under way, a diaphragm joint has been running deflected the equivalent of 10



This exploded illustration of one model of the new universal drive shaft shows completely and partially disassembled views of the diaphragm joints.

each end of a long quill shaft. This new unit is light and free from backlash. The load-carrying members require no lubrication and no heat is generated. Due to the symmetry of the design, any balancing problems are minimized.

Although initially designed as a heavy-duty drive for a remotely-driven, 300 h.p. gear box, the shaft, in a considerably lighter version, lends itself to driving remotely-mounted generators, pumps, superchargers, etc. Adoptions are also being worked on for flexible joints in helicopter drive shafts at more than 1,000 h.p. ratings. At present, the shaft has been run for more than 350 hours at loads between 180 and 225 h.p. at deflections up to 4 deg., and

deg. at speeds of 8,000 to 11,000 r.p.m. The joint has now been operating for over 1,500 hours without any servicing. Research work is continuing and applications are expected in power transmission phases of the aircraft, automotive, agriculture and process industries.

Heart of the new coupling is a series of eight steel diaphragms, each having a hyperbolic wall section whose thickness tapers to less than ten thousandths of an inch. These wafer-thin discs provide the flexibility necessary to permit misalignment up to 3 1/2 deg., yet are rugged enough to absorb power surges, peak speeds and maximum loads.

The long quill shaft shown in the illustration serves to absorb

and minimize any torsional oscillations introduced by the engine or driving members. The ball joints permit any shaft misalignments to be taken up by the diaphragms. One of the problems

inherent to the ordinary universal or Hooke's joint is the introduction of torsional accelerations by the joint. Since the new steel point is a constant-velocity unit, this problem is eliminated. [2615].

Time-Study Machine Calculates Job Loads

A new electronic machine now imitates the actions of factory machines and their human operator, at a tremendously accelerated rate, for rapidly determining production schedules and operators' allowances.

The "time-study computer" is designed to simulate machine and operator actions through electronic tubes, and to "perform" a day's work in seconds. Used to study frequently changing combinations of automatic-machine cycles, it is said to calculate the production on each machine of a group and the waiting time during which the operator is not operating any machine. So that he will not be penalized for an inefficient cycle, the operator is paid an allowance for this time under some modern incentive system. The computer is operated by one girl who sets dials from work slips. No more skill is required than for an adding machine.

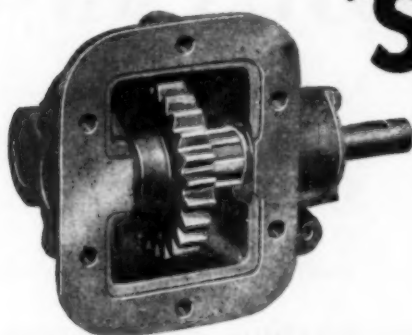
The computer can simulate the operation of as many as ten different machines at one time. Each individual loading and running time which has been determined by usual time-study methods is set into the computer, in decimal minutes. At the press of a button, the computer simulates operator and machines for any preset period, at a speed of 1,000 elements of time per second. Where times are carried to thousandths of a minute the computer simulates an hour of work in less than 60 sec. If times in decimal hundredths are inserted, ten

times this speed is achieved without sacrifice of accuracy, since electronic computation by the "digital" system is absolutely accurate to any number of decimal places required. Choice of operator's loading sequence is provided, and an automatic allowance for a higher than standard work rate where applicable.



Simulation of machine operation by this electronic computer speeds calculation of allowances, production schedules, etc.

Built in three panels, each six feet high and two feet wide, the controls can be reached from a seated position when arranged in a semi-circle. [2613].



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CAT. No. 2938: Helical gear power take-off applicable to 1948 Synchro Mesh Chevrolet and Maple Leaf.

CAT. No. 3000 A to M. This series is applicable to all other trucks not already mentioned.

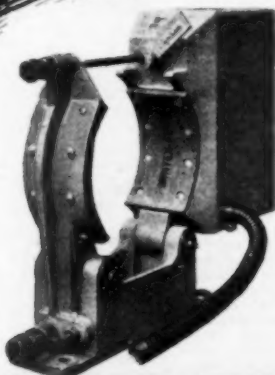
CAT. No. 2217 & 2218: Adaptor used with above to obtain high speed, correct rotation and depth of mesh.

CAT. No. 2095: Spacers used for adjusting depth of adaptor.

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SWIFT NEWSLETTER No. 62

CHROME CHEMICALS

Manufactured in Australia

A wide range of **Chrome Chemicals** is being manufactured by **Chrome Chemicals (Aust.) Pty. Ltd.**, at Granville, N.S.W. First and foremost is listed **Sodium Bichromate**, an important raw material in many industries, including chrome tanning, textile dyeing, and pigment manufacture, metal pickling, and corrosion inhibition.

To aid the chrome tanner and textile dyer still further, **Basic Chromium Sulphate** is available for delivery by tank car, thus overcoming the necessity for converting the **Sodium Bichromate Crystals**.

Chromic Acid, of primary interest to the electroplating trade, and meeting a very strict specification, is yet another of this interesting range. Others include **Potassium Bichromate**, used similarly to **Sodium Bichromate**; **Metachrome Mordant**, for the mordant dyeing of wool; and **Sodium Chromate**, finding use in the manufacture of pigments, corrosion inhibition and textile dyeing.

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Control System for Heating or Refrigeration

The increasing complexity of many industrial processes calls for more and more accurate maintenance of conditions, particularly by automatic temperature control systems.

Such systems are generally based on the well-known principle of the unequal dimensional change of two different materials with change of temperature. This is, of course, a thoroughly reliable phenomenon; the skill is in making use of it. Unless very long pieces of the dissimilar metals are used, the movement is inevitably small and, when used to open and close a pair of contacts, their movement is correspondingly minute.

Under these conditions a small amount of arcing usually occurs between the contacts, although it is universal practice to pass only sufficient current to operate a relay. This at length impairs the faces of the contacts and increases their electrical resistance, so that a definite pressure is needed before the full current can pass. Accuracy of control has then been lost.

A new British system overcomes the difficulty by reducing the current almost to the disappearing point and using it to control a simple electronic circuit which supplies the very much larger current needed to operate the relay. Arcing at the contacts is then virtually abolished ensuring their consistent performance. "Making" and "breaking" are effected by the lightest touch and the smallest separation; in fact the necessary movement is about two-millionths of an inch.

It is found, in practice, that in sensitive elements composed of materials in common use very small temperature changes are sufficient to produce this movement, even though the physical

dimensions may be small. Tests have proved that the lack of sensitivity one might expect to find in a short co-axial element due to the reduced differential expansion is very largely offset by the more rapid response which arises as a result of its lower thermal capacity. A miniature control with a 1 in. sensitive stem showed on test sensitivity of ± 0.25 deg. C.

The amplifier unit, enclosed in a small metal case, is normally mounted at some convenient point



The small size of this temperature control element permits installation at many hitherto inaccessible points.

near the element, but there is wide latitude in the length and type of connecting leads. To eliminate the need for skilled maintenance each component is carried in a socket on the chassis, making testing and replacement a matter of minutes. Multiple amplifiers, receiving the signals from as many as five independent elements, are available and represent an economy when there are several control points within reasonable distance of each other.

As the sensitive elements are very simple, the makers are able

(Turn to page 25.)



20 TON BROACHING MACHINE FOR SALE

EX FACTORY, ADELAIDE

£3,000

Ton Pressure	20 tons maximum at 900 p.s.i.
Stroke of Broaching Holder	64 inches.
Table Size	Front to Back, 20in. Left to Right, 22in.
Travel of Table	4 1/2 inches.
Table Movement	Manual.
Speed of Slide on Cutting Stroke	12 feet per minute.
Return Speed of Broach	12 feet per minute.
Horsepower of Motor	30 H.P. 3 Phase 955 R.P.M.
Type of Pump	Thompson Mono Radial 35 G.P.M. at 4,000 p.s.i.
Frame Construction	Fabricated.
Floor Space	10 feet by 7 feet.
Height Above Floor Level	15 feet.
Depth Below Floor Level	4 feet 6 inches.

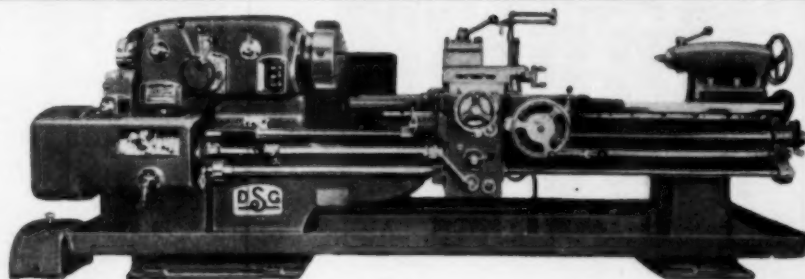
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18 forward spindle speeds and 6 reverse speeds over a wide range of 80 to 1 between fastest and slowest speeds.

3 different ranges of spindle speeds, from as low as 5.3 to 420 r.p.m. to as high as 10 to 800 r.p.m.

A wide range of feeds 12 to 800 cuts per inch with multi-change gearbox. Feeds are 8 times as coarse with coarse pitch ratio engaged.

Screw threads from 64 t.p.i. to as coarse as 8in lead.

Perfectly steady traverse by leadscrew when cutting coarse leads is due to ball-bearing mounting of drive to screw, combined with large diameter screw and shafts.

Heavy roughing cuts without chatter, and high speed cutting, are possible through extra bearing for spindle, heavy diagonal ribbed bed, and massive support to the tool.

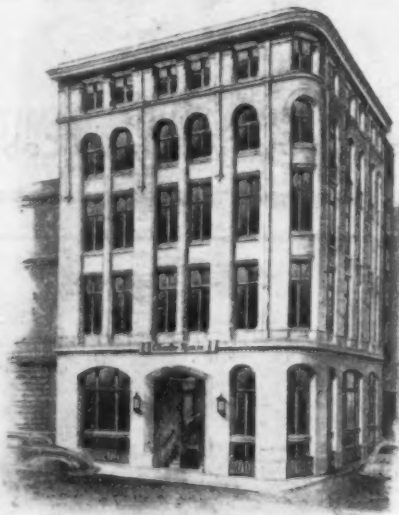
Finish turning of high quality is obtained from final drive through ground helical gears on high speed range.

3 spindle bearings — plain or roller.

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(Continued from page 24.)

to build them from standard components exactly to the requirements of the individual job without any considerable extra cost. The small size permits installation at many hitherto inaccessible points and the flexibility of design ensures that justice is done to the high accuracy of the system, whether applied to the control of the temperature of gases, liquids or solids.

A graduated range controller, which adjusts mechanically the

gap between the contacts, is usually embodied in the element unit. The actual range of adjustment provided is also dictated by the particular requirements and may be anything from a few degrees to several hundred.

Applicable to the control of any form of heating (at present up to 600 deg. C.) or refrigeration process, this system represents a real advance in performance and adaptability, and it is being ever more widely used both in the workshop and the laboratory. [2811].

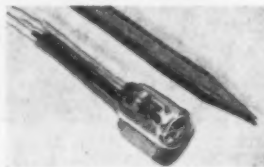
Miniature End-viewing Photocell

A photocell, of particular value for use in conjunction with extremely small and compact lens systems, has recently been introduced. This new photocell is illustrated in the accompanying figure. It is specially designed for an end-on aspect of illumination, and is only $1\frac{1}{8}$ in. long, with a diameter of no more than $\frac{1}{8}$ in. It can thus be made to form part of a cylindrical optical system of

maximum anode voltage, 100 V.; maximum cathode current, 3 mA.; and dark current at an anode voltage of 100 V., 0.05 μ A.

A gas-filled type, the 58CG, is also available for "stop-go" applications, where the light changes are large and sudden. [2598].

Cloth-Pulling Machine Moves Wet or Dry Cloth



End-view photocell shown in comparison with an ordinary pencil.

very small dimensions, and is particularly useful where it is desired to have multiple banks of photocells in operation.

The photocell is of the vacuum type, having a caesium/silver-oxide cathode which is highly sensitive to incandescent light and near infra-red radiation. The cathode represents the largest possible activated surface consistent with the small dimensions of the cell, the projected cathode area being 0.17 sq. in. (1.1 sq. cm.). In spite of its small size, the cell has a sensitivity greater than 15 μ A per lumen. Other characteristics are as follows:

A new cloth-pulling machine for moving tubular or piece goods, wet or dry, from one place to another, has been developed. The unit can also be used to load or unload trucks, kiers, extractors, bins, etc.

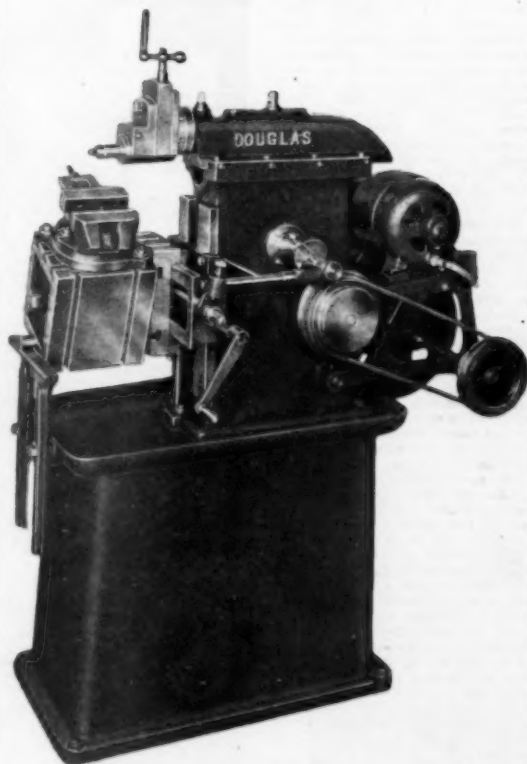
Cloth is pulled by two rollers. The topmost is 8 in. in diameter and is made of white rubber; the bottom roll is of steel, 6 in. in diameter, and is positively driven. The upper roll is supported in a fitted block and is attached to a shock absorber which protects against sudden shocks caused by knots, tangles, breaks, etc.

Poteyes are mounted on opposite sides of the frame work in front and back of the rollers to pilot and deliver the cloth properly to and from the rollers. One plate supporting a poteye is flat, the other is of an angularly bent form which can function as a deflecting apron. It will deflect the cloth into bins or kiers or trucks. It also acts as a shield to eliminate the possibility of the hands of any attendant becoming mangled in rollers. [2814].

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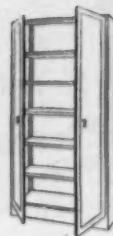
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How can you provide positive protection to a punch-press? One way is to . . .

Make the Guard Part of the Die

Integral enclosure guards of transparent plastic can't be made unsafe by faulty adjustment because they can't be adjusted. Bonus values include reduced setup time and elimination of storage and record problems.

INDIVIDUAL enclosure die guards, where they can be applied, give more adequate protection to punch-press operators than are possible with any other guarding devices developed to date. And after almost five years of study it has been found that transparent plastic guards like those shown are more satisfactory than similar enclosure guards made from other materials.

A single-purpose enclosure guard built for a specific die, and properly attached to it, is safer than any adjustable guard yet studied. Since no adjustments are possible, the press operator cannot change adjustments and make the guard unsafe to operate.

Such guards also eliminate the possibility of operating a die with-

out a guard. If the guard is mounted on the die when it is delivered to the press, the operator is going to use it. The problem of storing guards also is eliminated and no elaborate record system is required to determine which guard goes with which die. With more than 7,500 dies on storage shelves in the plant referred to in this article, this could be a real problem.

Also, the permanently mounted guard reduces set-up time. You put the die in the machine, and it is ready for use. We are convinced the guard also minimizes mental fatigue of the operator. A man can work closer to the guard without danger to his fingers. When he realizes this, he is no longer "on edge," reminding himself to be careful.

The individual enclosure die guard has some disadvantages. It is more expensive to make and it must be kept clean. There is no doubt that there will be some breakage, though we have not experienced any loss from guard breakage to date.

Guard maintenance is a problem when the die is repaired or sharpened. As the die blocks and punches are sharpened by grinding, the guard must be altered to suit. Also, the individual guard can increase the cost of a press operation unless it is designed carefully. There have been a number of cases where we have found it necessary to alter a guard after it has been placed in operation, so it would not hinder the operator and increase the cost of the part.

We normally consider that a maximum opening of 2 in. can be provided in the guard for inserting stock. Actually, larger openings can be provided in some cases. For every inch that the nip point is removed from the guard point, we allow an extra 1/2-in. opening. In other words, if the nip point is

1 in. back from the guard line, we would allow 1 1/2-in. opening instead of 2 in.

It also is important not to produce "pinch points" in the guard itself. The guard must be designed for the maximum stroke with which it will be used. Then the guard can be used on a press with a shorter stroke, but usually cannot be employed in a press having a greater stroke. This is because the upper and lower shields of the guard must telescope. If the stroke is greater than that for which the guard was designed, the telescoping guard will separate, allowing a pinch point which could be very dangerous.

We have developed plastic enclosure guards for operations in which strip and sheet stock are fed from the front, from either side, or even from the rear, where the scrap and the part must be ejected and separated at the front of the die. We also have found that we can use various methods of part ejection.

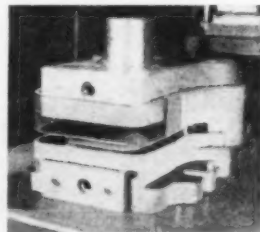
Obviously individual enclosure guards cannot be made for all applications. We have many large combination dies for which we have as yet been unable to design a satisfactory individual die guard. In addition, there are numerous forming, swedging, coining, and similar operations where individual guards would not be satisfactory, usually because of the difficulty of removing the work from the die.

For these operations, we prefer, writes Richard F. Thuma in "The Machinist," either a two-hand control arranged with a non-repeat device, or made so both controls must be held down continuously throughout the stroke of the press, or a gate guard designed so the ram clutch can be actuated only when the gate is closed. Two-hand control is unsatisfactory with slower presses having single-stroke clutches, if the operator can beat the ram.

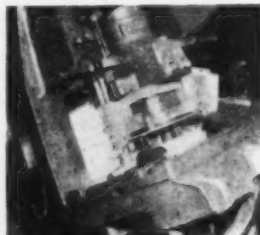
The importance of establishing a centralized control to co-ordinate die design, guard design, and fabrication was quickly realized. As a result of committee recommendations, tool engineers respon-

sible for die design have been made responsible for the design and installation of guards. A pro-

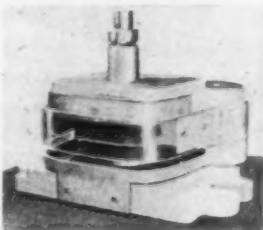
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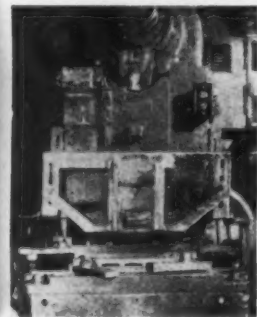
Telescoping plastic sections are suitable for presses with stroke not exceeding 2 1/2 in. Operator cannot possibly get his hand in the dies except from the rear.



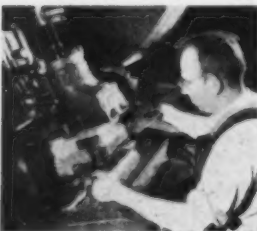
Stripper and stock move 1/2 in. in draw operation in the die. If a 1/2 in. opening were allowed for stock, plus opening for stock to move, the 1/2 in. needed would be risky. So lower half of guard is mounted on stripper plate, moves with stock, and opening need be only 1/2 in.



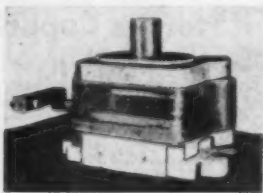
Sheet steel upper shield and plastic lower shield are combined in this guard. Steel—cheaper, stronger, easier to fabricate—is used whenever visibility is not required.



OLD. Enclosure die guard had several adjustments to fit different dies. At the corners it was practically impossible to maintain the 1/2 in. maximum opening now considered essential to protect operators.



NEW. Clear plastic guards provide view of the operation, cannot be adjusted by the operator to be unsafe, and are left on the die in storage. In five years of use there has been no accident with a die protected in this way.



After four years, this is how plastic guard looks. Stock is fed in through slot at right and against stop after passing through a similar hole at other side of guard.

GUARD APPROVAL CARD 158535			
THIS CARD IS SUBMITTED TO THE DIE SHOP FOR APPROVAL OF THE GUARD DESIGN.			
Machine No. 0018 - Type of Operation PLANK - Size 1-3-20			
Date 10-10-50 - Die Drawing No. 10-3-20-000			
Current Order No. 1-2500-7153			
Name of Guard Designer INDIVIDUAL COMPLETE ENCLOSURE			
Date this is No. 2nd, 3-6-50 - Guard Order No. 1-210-2916			
Guarding Schedule	Item Part	Item Part	Approved By
1. Guard Body	1-2-20	1-2-20	1-2-20
2. Guarding and Safety	1-2-20	1-2-20	1-2-20
3. Stripping Plate	1-2-20	1-2-20	1-2-20
This Guard Has Been Inspected and Approved by the Die Shop			
Signature of Die Shop Inspector			

New Dunlop Research Centre Opened

Solving Day-to-Day Manufacturing Problems

A new Research Centre was opened recently at Fort Dunlop, England, by eminent British scientist, Sir Lawrence Bragg. This central research organisation will carry out fundamental research and intensive development for the world wide Dunlop Group of Companies.

Although each Dunlop Company has its own technical organisation for solving day-to-day manufacturing problems, for many years past the need has been felt for some central organisation. Plans were first considered in 1938, but were placed in abeyance at the outbreak of war. After the war these plans again saw the light of day, and in 1947 constructional work was commenced. Post-war conditions did not permit extensive building operations, but Dunlop were fortunate in acquiring part of the Vickers-Armstrong Shadow factory adjacent to Fort Dunlop. The Vickers two-floor administration building now houses the main laboratories, the power house has been modified and extended to become a Pilot Plant, and an entirely new engineering services building has been erected.

BECAUSE of the many peculiar properties of rubber itself, the rubber industry is linked with many different sciences. The Dunlop Research Centre is at present staffed by some 275 research workers, a large proportion of whom are university graduates, and these are recruited from the fields of Chemistry, Physics, Compounding, Textiles, Statistics, Industrial Design to name only the most important.

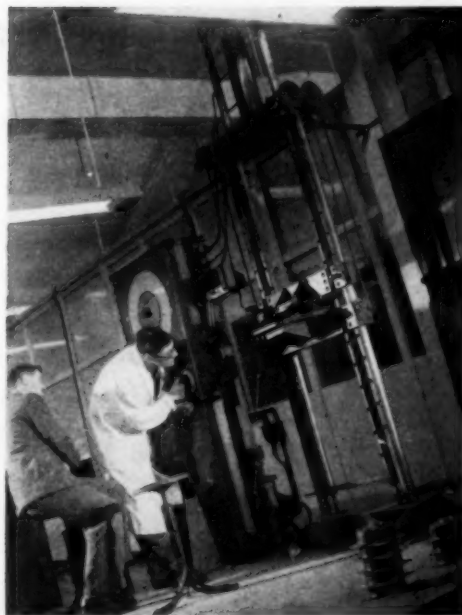
The work is divided into two groups, which work in close co-

operation and share many common services. The "research" group concentrates on long range research in the fields previously mentioned, while the "development" group has the responsibilities of turning the research workers' ideas into factory propositions, and of giving service to other

Dunlop companies in respect of specific problems. New techniques are tried out on a semi-production basis in the Pilot Plant, virtually an experimental factory, before being passed out to the appropri-

ate Dunlop factory for commercial use.

This big organisation is housed in buildings which cover two acres on an eight acre site leaving room for expansion. The total floor



In one of the Physical Development laboratories these research workers are operating a compression test machine to measure the properties of anti-vibration mountings.



This picture shows the operation of a stability test for rubber latex by a research worker, who is using a strobo-flash to check the revolutions of the high speed stirrer.



Dunlop Research Centre.

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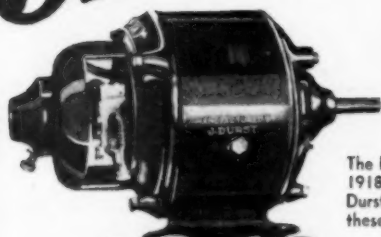
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(Turn to page 32.)

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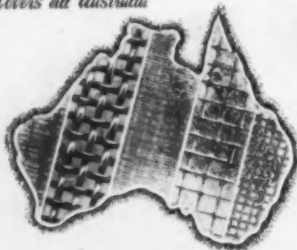
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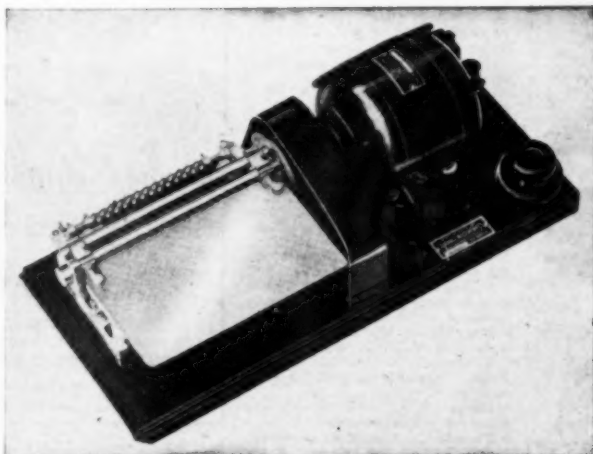
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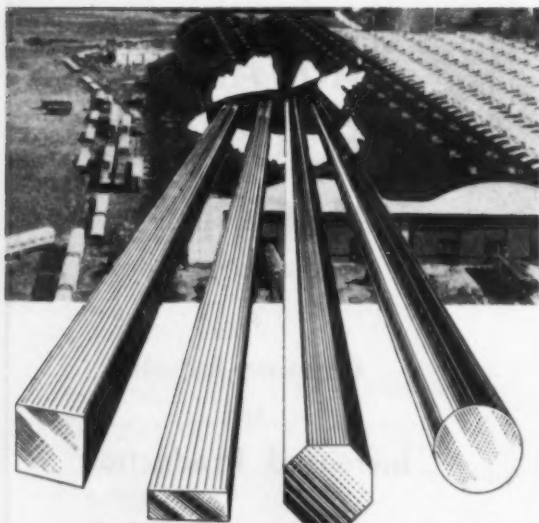
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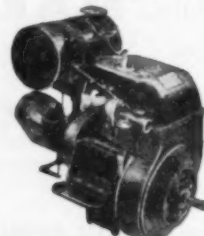
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THE AUSTRALASIAN MANUFACTURER
[October 14, 1950, Page 35.]

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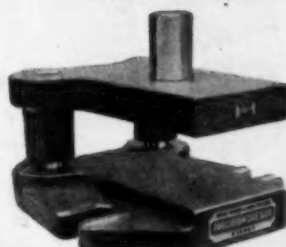
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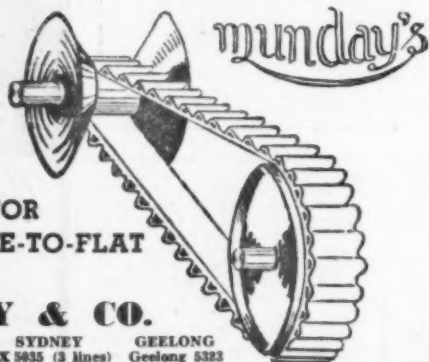
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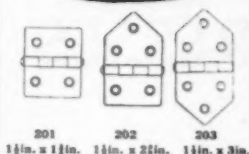


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OXYGEN LANCING.

It was evident that the steel industry's lively programme of research and development had been taken a further step forward when a British firm recently announced the introduction of "oxygen lancing," an important advance in the refining of stainless steel. Sheffield steelmen, not normally addicted to superlatives, are describing the new process as "one of the most important advances in the production of stainless steel since its initial development."

The new process makes possible the large-scale purification and re-use of stainless steel scrap, most of which has hitherto accumulated at the works or been sold off at "give-away" prices. The process is now being widely adopted and is already having a marked effect upon the consumption of scrap. In 1946, by using older methods of recovery, only just over 6,500 tons of scrap were re-used out of the 22,500 tons which arose throughout the year. But during 1949, thanks to oxygen lancing, 37,841 tons were re-used out of the 38,213 arising.

Before the introduction of oxygen lancing, it was impossible when re-melting scrap in an arc furnace to prevent a pick-up of carbon from the furnace electrodes. A carbon content was thus produced which was considerably above the 0.08 per cent. required in stainless steels. The only way of removing excess carbon was to oxidise it by adding iron ore to the melt. But this process was slow and expensive and also reduced the valuable chromium content. Alternatively, scrap could be re-melted in high-frequency induction furnaces, but only small quantities could be handled by this method.

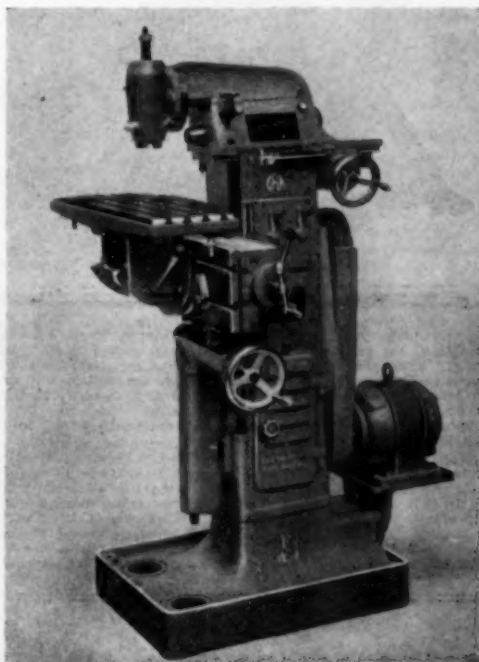
In the oxygen lancing method, oxygen is blown into the furnace at 400 cu. ft. per minute through a wrought iron or mild steel tube. The effect of this is greatly to increase the temperature of the melt (up to about 2,000 degrees C.) and burn out the carbon with a minimum loss of chromium.

The oxygen lancing process, is also being used, by a Welsh firm, for the production of low carbon alloy steels. Here the retention of chromium is not a problem, but use of the oxygen lance makes it possible to work down to a very low carbon content without a prohibitive consumption of electricity.

It would seem that the new process, says "Scops", should lead to a fall in the price of low carbon alloy and stainless steels, for a considerable saving is made in refining time and power consumption. In the case of stainless steel scrap, refining time is reduced by about a third, and further production time may be saved as a result of present studies in cutting down the cooling time after the oxygen blow. The electric arc is cut off throughout the 20-30 minutes of

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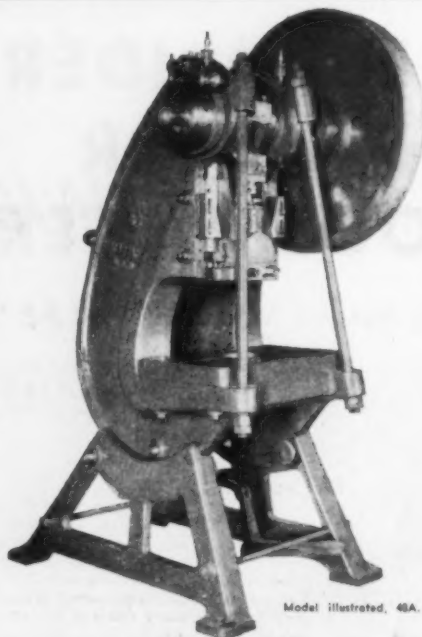
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the blow, which reduces power consumption to an average of about 850 units per ton. In the production of low carbon alloy steels refining time is cut from three hours to about 1½ hours, and power consumption from 8,000 kWh. to 2,400 kWh.

Several questions arise, however, before any precise estimate of cost reduction can be made. A lot depends upon the price and supply of oxygen, for which there is a steadily expanding demand throughout industry. Prices in general seem to be fairly stable,

apart from a recent small increase in bottled gas. But as there are no immediate restrictions on production, the expanding demand should, assuming no unforeseen rise in production costs, encourage a fall in prices.

Another question to be considered is the heavy wear on furnace linings caused by the intense heat generated by oxygen lancing. This may entail more frequent relining, which would be costly. To offset this, experimental use is being made of magnesite for linings in place of the rammed dolomite normally used. Magnesite is proving, so far to have certain disadvantages, and it will probably be a year or two before any definite conclusions can be drawn about its suitability. It would seem, therefore, that oxygen lancing is unlikely to produce any immediate effect on prices. But the economical consumption of thousands of tons of scrap to produce what is claimed to be a superior quality steel is itself a step forward of the first importance.

NEW DIE-MAKING METHOD.

That a quiet exchange of ideas between British and American manufacturers in the same line of business can achieve at least as much as a loudly trumpeted foray across the Atlantic by a "productivity team" is shown by the introduction of "composite forgings," a development in die-making which offers the sheet

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metal industry the possibility of a big increase in productivity.

The new die-making method owes its origin in England to collaboration between General Motors, one of the biggest automobile makers in the States, and the Britannia engineering group of Luton. General Motors, like most American makers of sheet metal assemblies, have used composite forgings in their dies for some time, and full facilities were given the Britannia group to study the way they are made and used. As a result, the forgings are now in full production at a new plant at Luton.

It has been found that use of composite forgings saves the American automobile industry from 30 per cent. to 50 per cent. in man-hours. Similar savings may be expected in Great Britain's car industry, and, indeed, throughout the whole of the mass produced sheet metal industry.

The making of suitable dies for stamping out sheet metal to the required shape is the first main step in the production of car bodies and chassis, rolling stock, and a host of smaller assemblies. The essential difference, says "Scope", between the composite type and older forms of die lies in the composition of the cutting blocks.

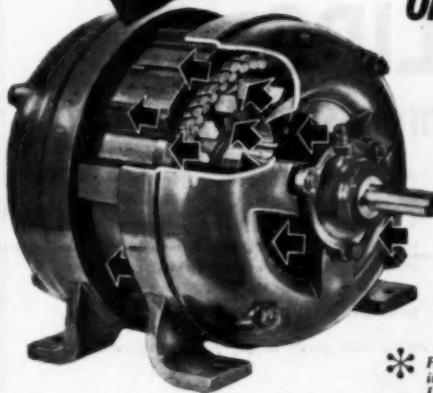
Dies made by conventional methods consist of a ring of rectangular blocks of tool steel pinned—or "dowelled," to use the technical expression—to an iron casting and machined to a cutting edge. This sounds, and indeed is, a simple construction in principle; but it involves in practice a number of long and costly operations, all of which stem from the use of tool steel blocks.

Before the blocks can be fitted, prolonged machining of the iron casting is necessary. Further lengthy machining and fitting is needed to shape the blocks into the right contour. The blocks must be hardened, and as hardening distorts the dowel holes through which they are fastened to the casting these holes must be re-finished before final assembly of the die. Hardening also distorts the cutting edge of the blocks, and these must also be re-finished. This whole sequence of operations must be repeated every time a worn or broken section is replaced during production.

The effect of this slow die-building method is to limit the speed with which new designs can be got into production. This applies particularly to the making of car bodies, where limited die-making capacity has long been a troublesome bottleneck.

The use of composite forgings instead of tool steel blocks cuts out many of the older method's time-wasting operations. The forgings comprise a cutting face of tool steel integrated with a mild steel base. As they are not so shallow as the steel blocks the iron casting base requires less machining. No dowelling into hardened steel is necessary since holes can be drilled and reamed in the soft mild steel base after hardening. Thus distortion is

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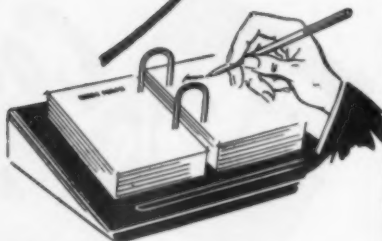
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avoided and dowel holes need not be re-finished.

The forgings are made dimensionally to the requirements of a particular die, which dispenses with the prolonged machining and fitting necessary in the old method. In the event of a breakdown of the die, a replacement

composite forging can be supplied within twenty-four hours and brought rapidly into production—as compared with the weeks of delay caused by replacing tool steel blocks.

The importance of this development needs little emphasis, particularly to the motor-car industry.

Use of composite forgings will cut the car makers' die-making time by about one-third and thus enable him to reach flow production on a new model much more quickly. The probable effect of this upon the industry's dollar earning capacity is a point worth noting. Die-making is, of course,

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Applied inorganic chemistry increases efficiency in many different industries. Borax, widely known for its household uses, finds its largest outlets industrially in the manufacture of porcelain enamels, heat resisting glasses, and so on. The form normally used is known as the decahydrate because it contains 10 molecules of water. Its usefulness is marred by certain shortcomings: its content of the active ingredient, boric oxide, is relatively low (36.52 per cent.), its water content relatively high (47.23 per cent.).

A new type of borax, with a higher boric oxide content, and various technical as well as practical advantages has been developed by the London, England firm, Borax Consolidated Ltd. The improved product, result of careful research, is the pentahydrate with only five instead of ten molecules of water. The percentage content is thus reduced to 30.92, while the boric oxide percentage is increased to 47.8. Thus, for all practical purposes, three parts of the pentahydrate equals four parts of the decahydrate.

As manufactured, the borax consists of fine, free-flowing granules, stable under normal atmospheric conditions and pressures, with a guaranteed minimum purity of 99.5 per cent.

The industrial processes employing borax fall broadly into two categories: those requiring borax to dissolve in water, and those which involve fusion, when the escaping water content imparts a stirring action to the furnace charge. In the former, the pentahydrate dissolves readily and at three-quarters of the weight of the decahydrate, gives an identical solution; in the latter, it loses water at temperatures below 200 deg. C. without excessive frothing and puffing.

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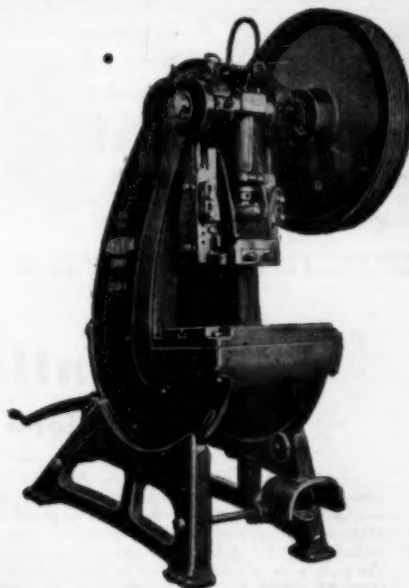
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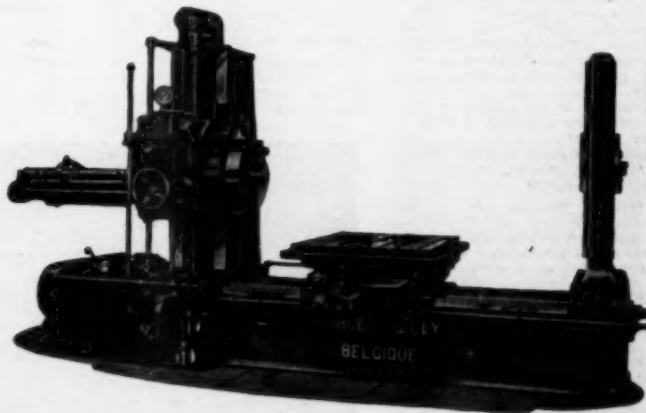
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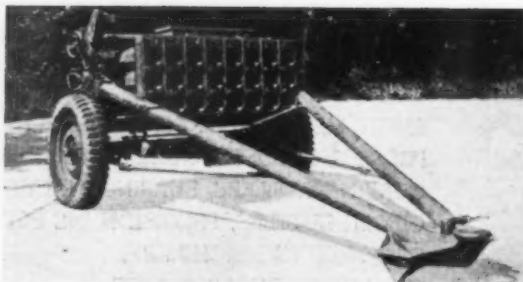
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A Challenge to Plastics

Modern Ordnance Problems

An important advantage of participating in military developments will often be the improved technique or the increased knowledge which these developments provide for attacking subsequent problems for civilian production.

As examples, this article lists military needs for extruded tubing of considerably increased size and for polyethylene heat seals of increased reliability. Any fabricator who solves either of these problems will thereafter have improved techniques at his command for use in connection with items for the civilian market. It will be recalled that practically all of the early work in solving extrusion problems with polyethylene and in developing post-forming techniques for thermosetting laminates was performed in connection with military developments. That accumulated experience is used to-day in handling polyethylene or post-formed laminates for civilian end items.

The prospect of direct profit on military items which are under development is not always promising, but almost every successful military development that is worked out will lead to improvement in the developer's position in civilian markets.

THE list of weapons and combat equipment for soldiers designed, developed, and supplied by an Army Ordnance Department, is a long one. It includes artillery weapons, small arms weapons, rockets, ammunition of all sorts, bombs, mines, hand grenades, combat vehicles such as tanks, transport vehicles, and fire control equipment for the aiming of guns. A list of the problems involved in this operation would be even longer—and many of the problems in modern Ordnance are problems involving plastics.

Artillery weapons such as field and assault guns pose a problem of protection of operating personnel and nearby equipment from the blast of the gun. A shield or screen is required in some instances to deflect the blast and the hot gases at the time the gun is fired. In one specific group of applications a plastic deflector plate would mean an important saving in weight, and the plastic material would not become as hot to the touch after successive firings as would a metal plate.

Any plastic to be used in this application would have to have a high resistance to delamination from the blast of hot gases, and would also have to have a high degree of resistance to erosion by the action of these gases. We would not expect most organic polymers to show these properties, but we know from other work we have

completed that even combustible polymers like phenol-formaldehyde can be used as binders for laminates that will withstand erosion from propellant gases if the filler of the laminate is non-combustible. Laminates made with asbestos paper or asbestos fabric as filler have shown a high degree of resistance to erosion by the hot gases, in spite of the fact that the

resin binder itself was not flame-proof or fireproof.

The main difficulty to date has been in locating a material which will have the requisite flexural strength combined with the desired lightness in weight. In addition, the surface must be sufficiently tough to resist serious cutting or pitting due to small particles of solid metals which are occasionally

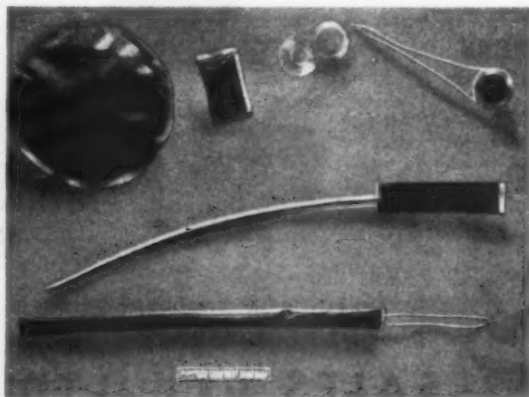
carried along by and are driven by the propellant gases. Since the total construction should preferably show a marked saving in weight over a steel shield of the same strength, we would expect that the final construction might consist of a plastic surface with a metal frame or plate.

IGNITER REQUIREMENTS

There is a class of Ordnance applications for which a variety of compositions—consisting of paper and polyethylene or fabric and polyethylene laminated together—would seem to be the best material. Every rocket and every round of artillery ammunition contains what is called an igniter. This igniter is a charge of black powder whose function it is to ignite the main propelling charge of smokeless powder which then drives the rocket or artillery shell. The igniter bears the same relation to the smokeless powder as the head of a match to its stick.

These igniters vary considerably in size and shape according to the rounds in which each is used. Current designs include igniters as small as a nickel and others which are as large as a soup bowl.

The chief requirements for a material to be used in igniter cases are: combustibility and/or friability; mechanical toughness over temperatures ranging from sub-zero as found in the Arctic to those encountered in desert storage; low



Ammunition igniters, varying in size and design, are polyethylene containers for black powder. Existing problem is ensuring film seal at low temperatures.



Plastic butt stock for automatic rifle requires additional reinforcement. Tests conducted on fully assembled weapon produced above results: (a) new stock before testing; (b) after side impact test; (c) after end impact.

moisture permeability; resistance to nitroglycerin; and the ability to be sealed safely in the presence of black powder. Polyethylene meets most of these requirements and will probably be used in a number of igniters. One of the special advantages of polyethylene is that it can be sealed at temperatures from 230 to 250° F., a temperature low enough to be used safely in the presence of black powder.

However, in some of these applications, polyethylene film fails because it has insufficient cut resistance, insufficient resistance to puncturing, or insufficient resistance to abrasion. In addition, polyethylene is unsatisfactory in some applications because it fails to burn completely under the conditions of time, temperature, and pressure when certain types of ammunition are fired.

In general, we have found that laminates of polyethylene with paper or with fabric show great improvements in all these respects. Improved resistance to cutting, puncturing, and abrasion would be expected, but the improved combustibility was a pleasant surprise which we had not anticipated.

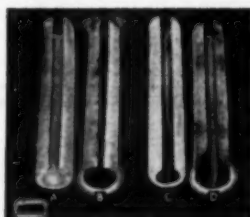
What, then, is the problem? It consists of getting a variety of polyethylene-paper and polyethylene-fabric laminates for a variety of different specific applications. Up to the present, we have been able to find sources of polyethylene-paper laminates in which heavy grades of paper are employed; but we also require laminates in which very thin grades of paper are used, and we have not been able to find sources either for this type of polyethylene-paper laminate or for any polyethylene-fabric laminate.

It must be pointed out that none of these has yet been tested to final conclusion; hence work would still be required, and this may involve decisions as to choices of materials and constructions.

DESICCANT CONTAINERS

An application of a somewhat similar sort is that of a desiccant bag container. The desiccant is most often silica gel, and containers made of this fabric were

used during the war. The objection to this type of bag is that dust and fine particles from the silica gel sift out. The principal requirements are good mechanical properties over a wide range of temperatures, and high moisture permeability. This last characteristic is, of course, the reverse generally desired in plastic sheeting or



Aluminium foil in plastic laminate is one answer to rifle hand guard problem; (a) and (b) without foil before and after firing; (c) and (d) with aluminium.

polymer-coated fabric. It just goes to show that if a product does not have the properties required for the big civilian market it may be exactly what the Ordnance Department needs. Sooner or later we seem to be called upon to provide every combination of properties that can be imagined.

There are few if any continuous plastic films which can be expected to combine as high a rate of moisture-vapour transmission as we need with the mechanical toughness required. We shall not be surprised if it is necessary to use either polymer-coated paper or polymer-coated fabric. In this case, the paper or the fabric would provide the necessary dust-tight layer. Holes as large as 0.00004 in. could be permitted but no larger.

The difficulty thus far has been in obtaining samples of coated paper or coated fabric for testing. We can get numerous samples of vinyl- or polyethylene-coated materials made for the civilian market, but these, of course, have low

moisture vapour transmission rates. What we need would seem to be paper, or fabric coated with ethyl cellulose acetate, or possibly with polyamides or some other polymer which could be expected to show a high moisture-vapour transmission rate.

ENDS FOR TUBING

We still need a method or construction technique for putting ends on glass-base laminate tubing to obtain high resistance to internal pressure. It is generally known that glass-fabric-base laminated tubing can be made with a high tensile and high bursting strength relative to its weight; but this tubing cannot be employed for containers with high internal pressure because there is no practicable and economical way of putting on end closures. Threaded end closures are blown out at pressures which are very low relative to the bursting pressure of the tubes themselves. Efforts to cut and tailor the fabric of the side walls to make a formed end closure have not been successful. In addition, end tailoring methods do not seem to be attractive for production in large quantities.



Protective dip coatings would find wider military use if lower application temperature were developed.

The solution to this problem could take either of two forms. A method for attaching an end closure might be devised which would avoid loading a side wall laminate in shear, or else a glass-fabric laminate might be developed with sufficiently high shear strength to permit it to carry the necessary shear load satisfactorily.

JEEP SIDE CURTAINS

We need better material for windows in side curtains of jeeps and for other automotive equipment. The material should be tough at temperatures as low as -65° F., have high transparency, and preferably have high resistance to abrasion and scratching. Cellulose nitrate increases the fire hazard. At present, the best usable material is cellulose acetate sheet, the most serious disadvantage of which is its relative brittleness at lower temperatures. If you have something that is equal to cellulose acetate in transparency, and in resistance to abrasion and scratching, and is superior in toughness at low temperatures, we would be interested in examining it further.

A proposed new material does not have to be perfect in the de-

sired characteristics to be worth consideration; we would be glad to have an improvement over the best currently available material even if the improvement falls short of the ideal.

HEAT SEALING POLYETHYLENE

Materials suppliers or one of the fabricators may be able to solve a problem concerning polyethylene sheeting. We need a method by which we can know that polyethylene has been properly heat sealed. We know that heat-sealed seams will have adequate mechanical strength providing the heat sealing is performed at a sufficiently high temperature, while a seam formed at a slightly lower temperature will peel apart very readily and will be very weak.

In most instances, after the seal has been made, it is impossible to determine by visual examination whether or not complete fusion of the polyethylene was obtained; the only way to test for a strong seam is to pull it apart. This method is obviously unsatisfactory. We need a non-destructive test or method of examination which will permit 100% inspection of polyethylene heat seals.

LARGE TUBES

The Ordnance has been using tubes of from 4 to 10 in. in diameter with 1 to 1 in. wall thickness which is prepared by rolling up cellulose acetate sheet 0.010 in. thick to make the required sizes. This method of tube preparation is expensive and is not entirely satisfactory from the point of view of mechanical performance. There is a demand for extruded cellulose acetate tubing in diameters of from 4 to 10 in. with wall thicknesses of from about 1 to 1 inch. Some tubing of these dimensions has been made by extrusion, but additional sources are desired.

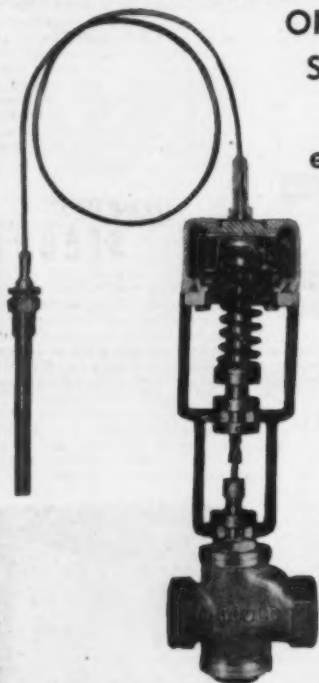


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DIP COATINGS.

A prospective outlet for polymers which cure at room temperatures exists in dip coatings applied at these temperatures. The hot melt dips which were employed during the war for the protection of metal parts in storage were usually applied at 325 to 375° F. For many uses in which a protective coating is required, only room temperature applications can be employed. The principal requirements are: 1) application at 120° F. or lower; 2) single dip to produce a film thickness of 0.020 in.; 3) must protect steel, copper, and aluminium from corrosion at elevated temperature and high relative humidity; 4) must strip readily and freely; and 5) must have a film strength of about 600 p.s.i. with about 75% elongation to break.

GREAT MECHANICAL TOUGHNESS.

The next two applications go together. The first is plastic hand wheels. The principal requirement is great mechanical toughness over the complete temperature range of -65° F. to +140° F. Polyester moulding materials filled with glass fibre are under consideration for this application, and we know of two sources for this type of moulding composition. If any readers have similar moulding compositions or have other moulding compositions with comparable mechanical toughness and mouldability, we should like to know about them.

Related to the hand wheels are the bearing bushings for the corresponding hand wheel shafts. The bearings are required to sustain light loads only. The difficult requirements are good mechanical toughness from -70° F. to +200° F., ability to withstand exposure to +200° F. for several hours at a time, and, preferably, self-lubricating characteristics—all combined with good bearing characteristics. Nylon would, of course, seem a good choice except for possible deterioration at 200° F. Phenol-formaldehyde bearings have less of a self-lubricating quality. Since these two best known plastic bearing materials are somewhat deficient in the properties we require, we are open to additional suggestions.

Another problem concerns a replacement for or improvement on polymethyl methacrylate guides and followers for electrodes in chromium plating; they have been dimensionally unstable in the chromic acid bath. Polystyrene will be tried in place of polymethyl methacrylate, but other suggestions are welcome.

A technique is needed by which optically flat polymethyl methacrylate surfaces, which will be free from stresses, can be prepared. Watch and instrument covers are required which have the clarity and abrasion resistance of polymethyl methacrylate and of cast allyl sheeting, but which are superior to these materials in me-

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chanical toughness, and which are flexible enough so that they can be bent more sharply than these two materials. Even greater abrasion resistance is required for other optical applications. At present, glass is being sealed to the plastic surface for this reason, but a plastic which does not need this protection would be well received; or in the absence of such a ma-

terial, an adhesive for glass to plastic over temperatures from -80°F. to $+150^{\circ}\text{F.}$ could be used.

There are two additional specific problems associated with adhesives. One is to make an adhesive stick, and one is to make an adhesive unstick. A bonding agent is needed for fastening polymethyl methacrylate to glass and for fastening cast allyl to glass. The adhesive

must be optically clear and must be usable over the temperature range of -80°F. to $+160^{\circ}\text{F.}$ In connection with unsticking, a practicable method of removing a cured adhesive of the GR-A phenol-formaldehyde type from metal is required. Ethylene glycol will remove the cured adhesive from glass but will not remove it from aluminium.

GUARDS FOR GUNS.

In rifles and other small hand weapons, plastics are of interest, because in hand guards and butt stocks they produce less finger chill in cold weather than do metals. A major additional requirement, of course, is high impact strength. To date, experimental plastic hand guards have had satisfactory low thermal con-

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ductivity and have been moderately satisfactory in impact strength, but have failed due to charring where the plastic guards are connected to the metal rifle barrel. The plastic rifle butt has been fairly satisfactory but has less impact strength than is desired. Materials or construction designs which would overcome these limitations would be welcomed.

An alternative approach is also receiving favourable consideration. This approach consists of using lightweight metals or sheet steel, and providing thermal insulation against chill by applying a relatively thick coating of plastic. Preliminary experiments with plastic-type coatings about 0.015 in. thick have been promising, but adhesion has not been entirely satisfactory and greater resistance is required to softening at high temperatures and to embrittlement at low temperatures.

COATING COMPOSITIONS.

A word of explanation is required about the three final applications which are to be mentioned. Two of these involve coating compositions, and one involves rubber compositions.

The spray-drape or cocoon method of storage and protection

is still in use, but there is room for extensive improvement. Spray-drape methods are required that can be applied rapidly, that will have low moisture-vapour transmission, moderate tensile strength, toughness at -65°F , low creep at $+150^{\circ}\text{F}$, and good resistance to outdoor ageing. In a somewhat related application, a sprayable coating is required which will bridge over holes $\frac{1}{2}$ in. in diameter, will dry rapidly, will have moderate tensile strength and good toughness from -65° to $+150^{\circ}\text{F}$, and will possess ready combustibility.

Neoprene cable jacketing has shown satisfactory mechanical pro-

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perties and resistance to lubricating oils at moderate temperatures but has not proved to be sufficiently flexible at -65°F . A neoprene or acrylonitrile-butadiene copolymer formation which retains good flexibility at -65°F , without serious sacrifice of properties at temperatures up to $+160^{\circ}\text{F}$, would seem to be what is required.

In the field of solid propellants for rockets and guns, there are many problems closely resembling those which confront the plastics industry. We are certain there are plastics experts who could give valuable advice in the propellant programme. It is hoped that any readers who believe they can assist in solving these problems will take the initiative in contacting the military service. One of the most widely used propellants is cellulose nitrate, or a mixture of cellulose nitrate with nitroglycerine. The experience and much of the fundamental scientific information which have been developed in connection with plastics and moulding problems would be expected to be significant in connection with propellants.

(This article was adapted by "Modern Plastics" from a paper by Lucius Gilman, presented at the S.P.I.—Armed Services Meeting, Washington, D.C. The opinions or assertions contained herein are the author's and are not to be construed as official or reflecting the views of the U.S. Army Ordnance Dept.).

BRITISH INDUSTRIES FAIR, 1951.

The thirtieth British Industries Fair will be held in London and Birmingham from April 30th to May 11th, 1951.

More than 100 trades will be represented, including a major display by the United Kingdom textile industry and a special open air display of civil engineering contractors' plant.

The B.I.F. will be in progress at the time of the opening ceremonies of the Festival of Britain and on this special occasion the Fair will undoubtedly be the finest and the most representative trade fair ever held in Britain.

Intending business visitors to the Fair from Australia are, therefore, strongly urged to reserve their hotel accommodation without delay.

Music While You Work

Some Legal Aspects - Statement Prepared by the Associated Chambers of Manufactures

The matter under consideration relates to the question as to the rights of the owners of factories to reproduce for the benefit of their employees: (a) Radio Broadcasts, and (b) Gramophone Records without being subjected to attack for infringement of copyright or performing rights; or to be subjected to the payment of royalties for the right to so reproduce.

SECTION 1 (2) of the Schedule to the Australian Copyright Act 1912 defines what constitutes "Copyright" in Australia. This Schedule is the British Copyright Act 1911.

Therein "Copyright" is defined as:

"the sole right to produce or reproduce the work or any substantial part thereof in any material form whatsoever, to perform, or in the case of a lecture to deliver, the work or any substantial part thereof in public; if the work is unpublished, to publish the work or any substantial part thereof; and shall include the sole right:—

- (a) to produce, reproduce, perform or publish any translation of the work.
- (b) in the case of a dramatic work, to convert it into a novel or other non-dramatic work;
- (c) in the case of a novel or other non-dramatic work, or of an artistic work, to convert it into a dramatic work, by way of performance in public or otherwise;
- (d) in the case of a literary, dramatic, or musical work, to make any record, perforated roll, cinematograph film, or other contrivance by means of which the work may be mechanically performed or delivered.

and to authorize any such acts as aforesaid."

Section 2 (1) of the Schedule provides—"Copyright in a work shall be infringed by any person who, without the consent of the owner of the copyright, does anything the sole right to do which is by this Act conferred upon the owner of the copyright.

The issue of factory broadcasts would be determined upon whether such reproduction constituted a public performance. It is assumed, of course, that the material reproduced was the subject of copyright. All the Case Law available points directly to the fact that in Australia, broadcasting in a factory to employees at work is performance in public and constitutes infringement of Copyright—see

Ernest Turner Electrical Instruments Ltd. v. Performing Rights Society; and Performing Rights Society v. Gillette Industries Ltd., 1943 (1) All England Reports 413. In another English case (Performing Rights Society v. Hammonds Bradford Brewery Company), Mr. Justice Maughan decided that loudspeaker reproductions of the British Broadcasting Corporation's Broadcasts in hotels infringed copyrights.

In an American case (American Society of Composers, Authors and Publishers v. Jewell-La Salle Realty Co.) published at page 224 in the May, 1931 issue of Patents and Trade Mark Review, the following decision was given:

"Do the acts of a hotel proprietor in making available to his guests through the instrumentality of a radio receiving set and loud speakers installed in his hotel and under his control and for the entertainment of his guests, the hearing of a copyrighted musical composition which has been broadcast from a radio transmission station, constitute a performance within the meaning of 17 U.S.C. Section 1 (e)? "Yes"

A case comparable with those above cited was decided in Melbourne in 1929. In an action brought by Australian Performing Rights Association against 3DB Broadcasting Co. Pty. Ltd., Mr. Justice Lowe found in favour of APRA.

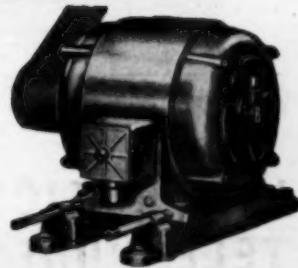
Communication to the public by radio-communication is one of the exclusive rights conferred by the Rome Convention.

It has been decided that anyone who switches on a receiving set in public is himself responsible for a public performance and will commit an infringement of the author's copyright notwithstanding that the performance of the broadcasting studio is licensed.

The above recited cases refer specifically to the reproduction in factories, hotels and the like of the broadcasts of radio stations. It seems clear the reproduction of Gramophone Records, the subject of copyright protection, would

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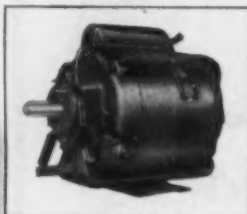
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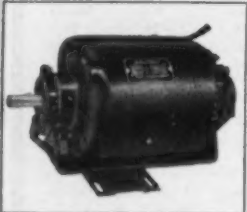


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equally constitute performance in public and constitute infringement of copyright. The British Copyright Act 1911 (as previously stated it constitutes the schedule to the Australian Copyright Act) amended the 1910 Act to provide copyright protection to mechanical instruments by means of which sounds may be mechanically reproduced. Section 19 (1) of the Schedule provides, inter alia:

Copyright shall subsist in records, perforated rolls and other contrivances by means of which sounds may be mechanically reproduced, in like manner as if such contrivances were musical works, but the term of copyright shall be fifty years from the making of the original plate from which the contrivances were directly or indirectly derived, and the person who was the owner of such original plate at the time when such plate was made shall be deemed to be the author of the work."

According to Copinger—On the Law of Copyright—copyright in a record is, in fact, analogous to the copyright which is obtainable by any person who makes a substantially new arrangement or adaptation of a musical work composed by another. The rights of the adapter are subordinate to the rights of the composer.

In relation to mechanical copyright Copinger states, "copyright may therefore be infringed either by making the contrivance which is capable of mechanically reproducing the work of another or by using the contrivance in such a manner as to cause the work to be performed in public.

The Australian Copyright Act gives an exclusive right to the author of dramatic or musical works to authorise the public performance or execution thereof.

In regard to the activities of the Performing Rights Associations in all the important countries of the world, the following quotation from a work by Dr. Stephen P. Ladas entitled "The International Protection of Literary and Artistic Property" is of interest:

"At the present time in all the important countries of the world, there are associations or societies for the collection of

performing rights of authors. Such associations are almost a necessity, especially in connection with the collection of royalties in small musical works by certain classes of users of music, such as entertainment halls, music halls, hotels, restaurants and the like. The composer, the music publisher and the user of music would be considerably embarrassed if they had to deal separately and directly for each piece of music performed. When such associations control a great number of musical works, they do reach a condition where they constitute a super-monopoly, and may conceivably abuse this monopoly by refusing to grant licenses upon reasonable terms, and thus hurt the public interest."

By Act No. 68 of 1933 the Australian Copyright Act was amended to provide for arbitration as to royalties to be paid for the performance in public of any work or for the use of records for public performance. Any party to the dispute may write to the Attorney-General for determination by voluntary arbitration by an arbitrator mutually selected.

Act No. 68 of 1933 as above incorporated in the Copyrights Act 1912/1935 provisions for these proceedings.

"Section 13A.—(1.) where any dispute has arisen between any person—

(Turn to page 82.)

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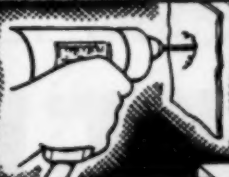
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(Continued from page 50.)

- (a) being an owner of copyright; or
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- (2.) The application may state the name of the arbitrator by whom it is desired that the dispute shall be determined.
- (3.) The arbitrator so selected or appointed may, upon receiving a submission to arbitration of the dispute, duly executed by the parties, hear the dispute and make his award in relation thereto.
- (4.) The parties to the dispute, by themselves, or, in the case of a company, association or body of persons, by their principal officers, shall, if required by the arbitrator, submit to be examined by the arbitrator on oath in relation to the matters in dispute, and shall produce before the arbitrator all books, deeds,

papers, accounts, writings and documents, within their possession or power respectively which may be required or called for, and do all other things which, during the hearing of the dispute, the arbitrator may lawfully require.

(5.) The costs of the arbitration shall be in the discretion of the arbitrator who may by his award direct to and by whom, and in what matter, those costs or any part thereof shall be paid and may, if he thinks proper, tax or settle the amount of costs to be so paid or any part thereof.

(6.) Copyright in any such work shall not be deemed to be infringed by the performance or use in public of any such work or record if payment for the right to perform the work or use the record is made at the rates, in the method and subject to the terms and conditions under which such works or records may be performed or used, determined by the arbitrator in pursuance of sub-section (3.).

(7.) For the purposes of this section "person" includes any company, association or body of persons.

(8.) The regulations may prescribe any matters for and in relation to the practice and procedure before any arbitrator selected or appointed under this section and the fees payable to any such arbitrator."

In the event of any dispute arising e.g. on the basis of excessive charges no statutory provision exists whereby the person desirous of using any of the works or records referred to in the Section is able to ascertain whether the alleged owner of the copyright is in fact the owner thereof.

This aspect of Industrial Property which is recognised as such under our Constitution is in striking contrast to the ready means already available to the

(Turn to page 50.)

Consulting the Consumer

The Meaning and Value of Market Research to Manufacturers

In the modern industrial society relations between producer and consumer are shaped by three distinctive conditions—the consumer is more or less free to spend his money as he wishes, the manufacturer produces his goods in anticipation of (and not in response to) consumer demand, and, thirdly, producer and consumer are separated, usually by a considerable distance.

THE simultaneous operation of these factors is comparatively recent in origin. Less than 200 years ago the typical producer provided for the needs of a handful of immediate neighbours, and for the most part he served them on a bespoke basis. Unlike the modern manufacturer he had not constantly to ask himself such questions as: Who are the people who are likely to buy my products? What will they be wanting in a year's time? How can I persuade them to spend their money on my goods rather than in some other way? These and similar questions, however, must be continuously posed and answered by the modern manufacturer who wants to stay in business. He must produce what people will want at some future date, he must distribute what he has produced to the points where consumers can most advantageously find them, and he must inform them through the most effective channels that he has produced the goods they want.

In coping with the problems created by these three characteristics of modern society—freedom of consumer choice, production in advance of expressed preferences, and geographical separation from his market—the manufacturer can draw upon several kinds of guidance. He can use hunch, common sense, and past experience. In some instances these may be sufficient. Yet to-day the businessman is increasingly extending these indicators by turning to market research.

Briefly, market research is the process by which the manufacturer

bridges to-day's gap between himself and his customers by asking them in a systematic way just what it is they are likely to spend their money on. Obviously the manufacturer cannot collect this information from all the people in the country, but if he can collect it from a representative sample that will do just as well. In fact, that is normally what he does, and to-day the procedures followed in most market research surveys conform to a fairly general pattern. A sample of the potential market is interviewed and asked to describe buying and consuming habits and the various factors which, either in personal circumstances or in the product, determine these habits.

THREE TECHNICAL PROBLEMS.

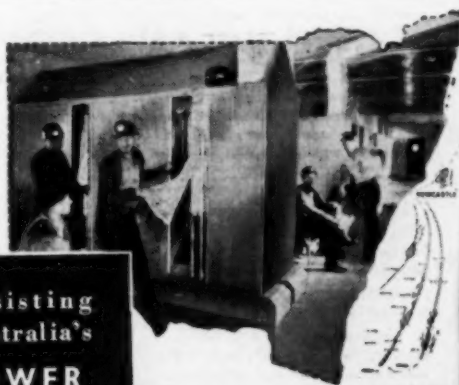
In carrying out such surveys, says Mark Abrams in "The Times Review of Industry," three major technical problems have to be solved—the selection of a sample of consumers which is truly representative of all the people who make up the potential market, the framing of a series of questions which when answered will provide reliable and relevant information, and the training and supervision of a staff of interviewers who can do this work objectively and honestly.

The technical niceties can be left to experts. Here it is, perhaps, more profitable to describe the sort of material which comes out of market research and the kind of guidance it can give the manufacturer when he comes to draw up his plans for production, for mar-

keting and for advertising. The best way to do this is to have a look at some examples.

At the beginning of this year a manufacturer interested in the British market for ground coffee called in his market research men and asked if their methods could furnish answers to such questions as: What proportion of the British people drink coffee? Who are these people—young or old, middle class or working class, men or women? How frequently do they take coffee? How much coffee do they

drink on an average day? At what time of the day do they drink their coffee—midday or evening, and with a meal or on its own? Why on these occasions do they prefer coffee to some other beverage? Where is the bulk of coffee consumed—at home or in restaurants? How do they like it—black or white, with sugar or without? How do non-drinkers feel about coffee? How far are coffee drinkers aware of the various brands on the market? Where do housewives go to buy their coffee? Which are the



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- GLOSCOAT in one operation completely preserves and protects.
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British Optical Co. Pty. Ltd.
Wingello House, Angel Place, Sydney. Tel.: BL 1344.

newspapers and magazines most commonly read by coffee drinkers?

The market research men decided there would be no difficulty in providing the manufacturer with precise and reliable statistics on all these points. It was first agreed that the potential market for coffee was to be found among the 37m. people aged 15 and over in Great Britain, and that, therefore, the sample of informants should be drawn to represent all sections of this part of the population. Next it was agreed that a sample of 3000 people would be sufficient to answer reliably for these 37m. With that out of the way they turned to consider what questions should be put to these 3000 people. After a few trial shots it was found that the soundest approach was to start by asking each informant to give an account of everything he (or she) had had to drink on the day before being interviewed—from the time he woke in the morning until he went to sleep; once this was recorded the more probing questions, followed easily enough.

Here are some of the findings which followed from interviewing these 3000 people along the lines indicated.

On the average day only 12.5 per cent. had taken any coffee.

The rate of consumers was appreciably higher in the middle class (28.9 per cent.), but since the working class outnumbered the middle class by nearly three to one the result is that the working class drinks over half the coffee consumed.

Among the "average day's" coffee drinkers (12.5 per cent. of the sample) the following conditions were found:

Two-thirds are content with one cup a day;

All but 25 per cent. avoid drinking coffee within two hours of going to bed;

Vis-a-vis all other drinks, coffee makes its best showing in the middle of the morning and at midday;

All but 25 per cent. take their coffee with a meal or a snack;

Only one person in 50 drinks black coffee—but one in 10 takes it without sugar;

Well over a quarter of all coffee was drunk outside the home—apart from beer and spirits, all other beverages (e.g., tea and cocoa) are much more domestic drinks.

Among the total sample it was found that half of the people disliked the taste of coffee and that more than three-quarters of them took coffee less than once a week.

This clear-cut picture of the British coffee drinker and his habits and preferences considerably aided the manufacturer when he decided what changes, if any, to make in his product, what long-term output he should aim at, what packs to use, what selling outlets to concentrate on, the advertising themes he should employ, and how to distribute his advertising allocation among the various media available.

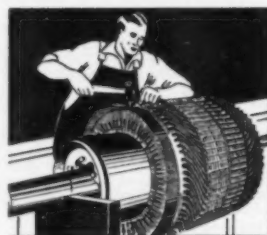
This market research inquiry is typical, and every day of the year

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similar studies are being carried out for manufacturers and distributors of synthetic detergents, boots and shoes, furniture, washing machines, tinned soups, cosmetics, fountain pens, cigarettes, wrist - watches, clothes, flour, breakfast cereals, refrigerators, toothpaste, and a host of other goods.

However, for every manufacturer using market research there are 10 who do not. Most of the non-users are, of course, to be found among the smaller producers. Sometimes their abstention is attributable to a lack of appreciation of what good research can do; sometimes it arises from a feeling that market research is too expensive. The sort of survey described above would cost between £1500 and £2000. Is that too much? Such a question only makes sense if it is followed by the rejoinder, "Too much in relation to what?" In relation to the size of the report received? As compared with the manufacturer's other costs of production and distribution? As compared with the cost of other methods of arriving at decisions? Or—and this is the only form in which the question makes sense—in relation to what losses might be incurred, or profits forgone, without it? Many a small manufacturer will often find that a few hundred pounds, or even a few thousand, spent on market research will bring far larger returns by saving the production of unwanted goods, by enabling him to open up new markets, by showing him where he should concentrate his sales effort, and by warning him well in advance of any changes taking place in consumers' habits.

There is another gap in the use made of market research by manufacturers. Even among those who lean on it heavily in the domestic market there are to be found many who are prepared to operate without it when it comes to producing for export markets. This attitude is all the more remarkable when it is remembered that the conditions which necessitate market research at home—competition for the consumers' spending power, production in anticipation of sales, and geographical separation between producer and consumer—are supplemented in the overseas market by differences of taste, of buying habits, of climate, of social habits and often of language. All these considerations call for more and not less market research. The need is perhaps greatest of all for those manufacturers who are attempting to break into the United States market—which so far as British goods are concerned is essentially a consumer goods market.

Certainly the American manufacturer is not prepared to dispense with market research in planning his assaults on the American consumer's pocket book. According to a recent analysis in the "Wall Street Journal" American business concerns spent in 1947 approximately 16m. dollars on "taking the public's pulse". In the first quarter of this year such expenditure had grown to an annual

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rate of nearly 25m. dollars. Some of this money—a very small fraction—went on public opinion polls concerned with politics, but far and away the greater part went on market research surveys to answer business men's questions: What kind of hair tonic do men prefer? What colour automobiles sell best? Is television more effective than radio as an advertising medium? What do people do with all the fountain pens they buy? (Answer—give them to other people.) How many housewives are planning to buy a new refrigerator in 1950?

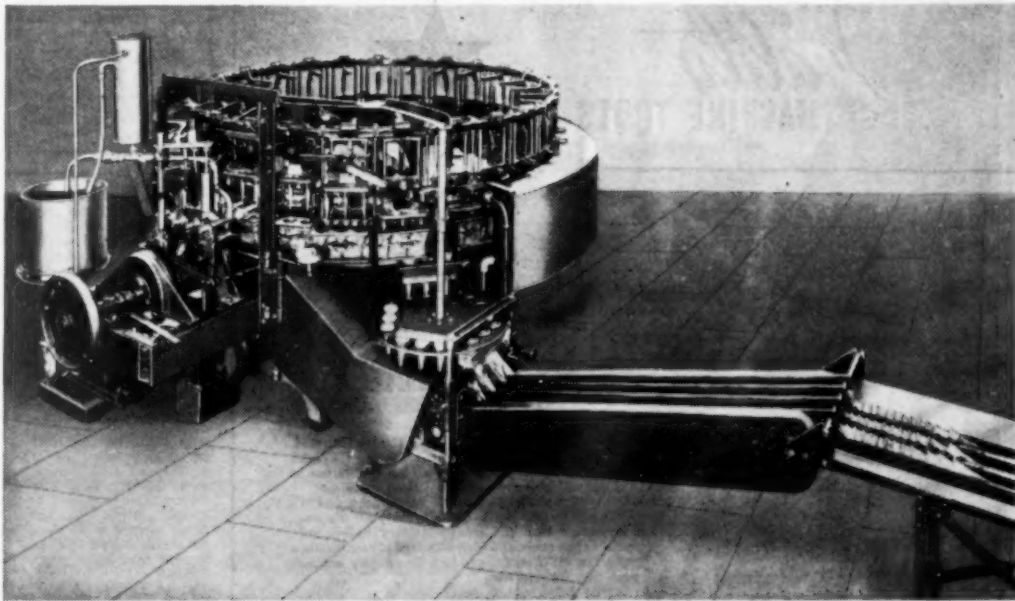
It has sometimes been suggested that British exports to the United States should reach an amount equal to 1 per cent. of the American nation's expenditure on consumer goods. If this is taken as a target then it could be argued that British exporters should devote to market research in the United States something like 1 per cent. of the 25m. dollars spent by American business men; it is to be doubted if they are spending even one-tenth of 1 per cent.

Up to a point this caution is understandable. Not only do the Americans carry out much market research; they also place a large part of their findings at the disposal of their potential competitors—free. In part, the explanation of this liberality is that much American market research is financed by U.S. Government agencies, by trade associations and by publishers of newspapers and magazines, and all these institutions feel that their own interest as well as that of the public is best served by giving wide publicity to their findings. Whatever the reason it remains true that the British exporter who wishes to benefit from market research in tackling the U.S., and also the Canadian, markets can do so up to a point without spending a penny. For example, Mr. Abrams quotes the findings of three such published reports.

The first is "The 1949 Survey of Consumer Finances" published by the Board of Governors of the Federal Reserve System. It reports an inquiry carried out among a sample of 3510 households. On this basis there are estimates, among other statistics, of how many American families have incomes at various levels (12m. of them received 2000 dollars or more in 1948); for each income group there is shown, first, how many refrigerators, home freezers, washing machines, television sets, kitchen ranges, automobiles, vacuum cleaners, radio sets, and houses they owned; secondly, how many they had bought in 1948 and how they had paid for them; and, thirdly, how many of these durable consumer goods they planned to buy in 1949, and how much they intended to spend on each purchase. To give reality to these intentions all informants were asked for an account of the liquid assets they held (e.g., bank account balances, savings, and Government saving certificates). In 1948 the American people spent 40,000m. dollars on these durable goods and the survey provides any manufacturer interested in this market with nearly all the facts he needs to identify his target.

The second example takes us north and is entitled, "Canadian Consumer Survey, 1949." This is a survey commissioned and published by the Canadian Daily Newspapers Association. Again, by using the method of directly questioning a comparatively small but representative sample of the total population, it has been possible to compile a reliable picture of the possessions, buying habits, and brand preferences of the various sections of the Canadian public. One especially interesting part of this survey asked Canadians for their views on imported United Kingdom goods and on competing goods of United States origin. The general impression is

(Turn to page 58.)



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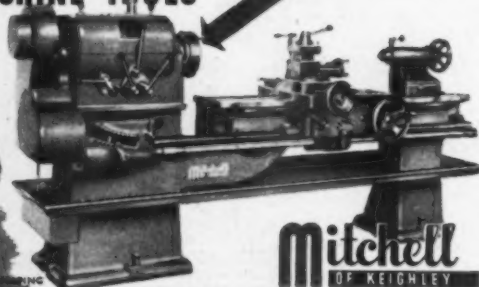


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"HOBART"
This machine is designed for the production of small diameter shafts, spindles, and other similar work. It is a compact, sturdy machine, and is capable of turning work to a high degree of accuracy.

(Continued from page 56.)

that on price, styling, availability, packaging, and servicing, American goods were rated well ahead of British goods: the contrast between them, in the eyes of the Canadian buyer, was the far greater superiority of the American goods in styling.

The third example again comes from the United States—a small brochure entitled, "The Last Frontier of Profits" and published by the Bureau of Advertising on behalf of the American Newspaper Publishers' Association. This collection of extracts from a much larger body of information obtained by market research relates to the consumption of, and expenditure on, a variety of goods and services—scurvy cleansers, cornets and brassieres (in Colorado per capita expenditure on these items is 2.33 dollars per annum, in Virginia only 99 cents), overseas travel (60 per cent. of all

American tourists come from four States—New York, California, Illinois, and Pennsylvania), life insurance, flour, chest rubs (rural areas and very small towns between them account for 68 per cent. of total United States consumption of these medicaments), automobiles, canned meats, coffee, electric refrigerators, electric ranges, packaged candy (in non-drinking and non-smoking Utah per capita consumption is four times higher than in Minnesota), anti-freeze mixtures, synthetic detergents, tea (in the South peak consumption is in July and August), and breakfast cereals.

General surveys of this kind come in a constant stream from the research workers and their employers in the United States. The British exporter who cares to make use of them will find that they often go to at least half-way towards answering his problems and that his own allocation for

market research can accordingly be concentrated on more detailed inquiries.

LOCAL BUTTON PRODUCTION.

Mr. A. G. R. Griffiths, chairman, General Plastics Ltd., Camperdown, New South Wales, announced at the recent annual meeting of the company that his organisation had advised the Customs Department that certain classes of buttons are being imported at concession rates, to the serious detriment of the local button industry. "Possibly dangerous competition," he said, "is coming from East European countries working under controlled economics, which appear to be underpricing buttons in an attempt to flood the local market." This constitutes a serious threat to a relatively new and increasingly important department of

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Australian manufacturing industry. The question, accordingly, should receive the prompt and the earnest attention of the Minister for Trade and Customs.

By way of keeping fully abreast of developments overseas, the company is importing injection moulding equipment which will produce a number of new lines.

After Business Hours

(Continued from page 3.)

idly reducing its railway system to a skeleton of heavy-traffic routes and the recent transfer of most of the former Belfast and County Down system to buses and lorries passed off without any difficulty. And it is clear that there is increasing scope for the road vehicle in the development of new areas.

It is, moreover, highly interesting to see how, in those cases where competition with railways is permitted, the fast comfortable coach can attract traffic from the trains, whether it is at home over the 400 miles between London and Glasgow or over far longer distances in Argentina, Brazil or the Union of South Africa. In Australia, where the railways suffer breaks of gauge, it is not so surprising that a coach can compete with the Sydney-Melbourne train service, as well as with the airline on this route. Competition with the latter is partially aided by the long drive to airports and also reflects differences in fare.

There is, it is fully evident, a most interesting phase of bus and coach development in prospect. What has the designer done to assist the traffic and commercial man in his efforts to provide the public with what they want? First of all, from 1939 onwards he has developed the diesel engine; its vibration has been reduced and there are prospects of its becoming quieter in future. Its low fuel cost has proved a most valuable weapon in the fight to keep fares stationary despite rising wages.

The introduction of the under-floor engine has saved valuable space. This version is usually the orthodox type turned on its side and suitably modified, especially in the disposition of its components for ready accessibility. Well before the 1939 war, a large fleet of underfloor-engined coaches was supplied to the Green Line department of the London Passenger Transport Board.

(Turn to page 60.)

BRITISH TRANE HEATERS



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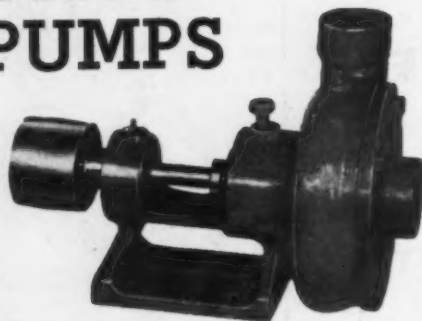
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(Continued from page 58.)

Then chassisless or integral construction has become an accepted thing of recent years. Conventional body construction has improved steadily over the years to prolong the trouble-free life of the vehicle; "all-metal" construction—in which a pioneer part was played by the Metropolitan-Cammell organization following its experience in building metal railway coaches—revolutionized the principles of design and provided an effective answer to the difficulties of obtaining good quality timber. Then there are such refinements as cutting short the chassis frame of a double-decker and hanging the staircase and platform by a cantilever arrangement from the upper deck structure, or the development of bonnet design to reduce cleaning costs.

But in such a vehicle there is still the chassis carrying the engine and wheels and—duplicating it—the underframe of the body structure. By combining the two an obvious and valuable saving of weight could be made and something approaching the mathematics of stressed skin aircraft construction be achieved with improved reliability and reduced maintenance. The Metropolitan-Cammell-Weymann organization was early in the field with a practicable design and in 1938 began a large order of chassisless trolley-buses for London.

More recently the problems of adapting the idea to the diesel-engined bus have been tackled, resulting in the joining of forces between M.C.W. and Leyland to make a chassisless bus with underfloor engine. So was born the Olympic, already famous, although only launched in public early in 1950.

For British use, the Olympic offers a 30 ft. 44-seater if need be; for overseas the construction has been adapted to much larger units, either with more seats still

or with luxurious comfort—according to the user's needs. Separate entrance and exit, with generous standing room, make it an ideal city bus design. The combination of Leyland engine and synchromesh gearbox, along with the M.C.W. constructional features, makes a delightful vehicle to ride in or drive. It is significant that the first large order came from Uruguay and we foresee that the Olympic will have a great export career, since there are so many duties for which it can be adapted, so many places where it may prove superior to other means.

The advent of the railway and the aeroplane have not, as some may have feared, rung the death knell of road transport. It is more than ever clear that road passenger services are essential to the general transport plan; in the future development of backward areas and the economic reorganization of existing systems the bus and the coach will have their own important parts to play.

Music While You Work

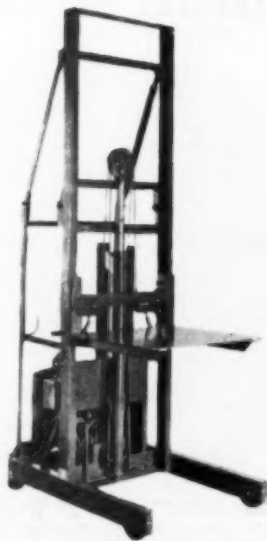
(Continued from page 52.)

community for a person to ascertain the rightful ownership of other property e.g. Land Titles, etc.

In fact, the position in Copyright Law of the Commonwealth does not necessitate a person claiming ownership of copyright to even go to the Copyright Office before asserting his claim therein. In fact, he need only approach the Copyright Office for the purpose of registration of his copyright if and when he is desirous of invoking summary jurisdiction in order that he may proceed against the alleged infringer.

(Turn to page 62.)

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Frames can be hinged to pass through doorways at no extra cost.

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The new model incorporates a limit switch.

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(Continued from page 60.)

So far as we are aware no dispute has been determined by an arbitrator appointed by the Attorney-General pursuant to his powers under Section 13A. of the Copyright Act.

Some years ago Canada, as a result of appreciating the great inconvenience to the community in consequence of this position of affairs, introduced legislation rendering it obligatory for the person claiming ownership of copyright in order that the community could at least have available to it a recognised Government instrumentality which it could approach to ascertain its position.

This therefore suggests, says the A.C.M.A., that perhaps the time has arrived, even though somewhat belatedly, for the Commonwealth to take similar legislative action.

One of the most important phases of the die-guarding programme has been the establishment of an automatic procedure to assure that old dies will be guarded as they are required for use. A large percentage of the 7,500 dies in the plant may never be used again, except to make repair parts. While some of these dies are 30 to 40 years old, they must be kept on the die-storage shelves. Obviously, it is not advisable to start a hit-or-miss programme of guarding all of these old dies.

Therefore, the planning department notifies the tool engineer several days before an old die is to be placed into production again. The tool engineer then authorises the construction of a guard supplying advice if required.

It should be pointed out that the guarding of a die, or the operation of any guarding programme, should not relieve the foreman of his responsibility for safe operation of production equipment. Only the production department itself can adequately supervise men doing production operations to be certain they are using tools and guards as they should. We believe it is still the foreman's prerogative and responsibility to stop an operation if a guard is not provided, or to order a guard for a particular die, if he considers it necessary, regardless of any established procedure.

Punch Presses

(Continued from page 28.)

gramme has been set up to ensure the provision of guards for all new dies, and the guard is made part of the order on which a new die is made. Where a suitable individual guard cannot be provided, the tool engineer must specify some other guarding method when the die is designed.

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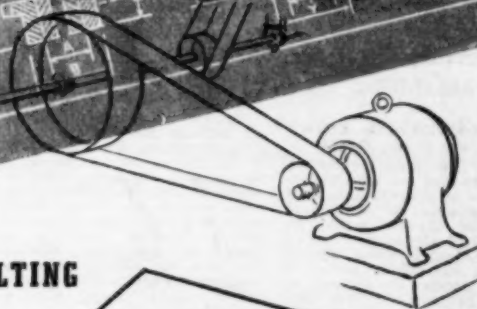
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PATENT & TRADE MARK NEWS

Complete specifications lodged with the Patents Office are open to public inspection almost immediately after their lodgment. Interested persons are now able to obtain the details of an invention for which protection is being sought.

Provision is also made (Patent Act, 1946) for an applicant to obtain damages, if infringement occurs, from the date of publication of the application. A rule of practice has been established whereby an application will be examined more speedily when a prima facie case of alleged infringement is proved.

Particulars of the necessary procedure will be supplied by any Patent Attorney practising in the Commonwealth.

PATENT SPECIFICATIONS ACCEPTED

DRAUGHT-EXCLUDING STRIP.

138,208.—T. J. R. Bright.

Claim 1. A draught-excluding strip of the kind set forth including a core of comparatively hard material arranged in relation to the tubular effective portion to form a fixed abutment of comparatively narrow width against which the said tubular portion is squeezed during the action of closing the door or the like, whereby an efficient seal is formed between the door and the co-operating fixed part.

ELECTRON DISCHARGE DEVICE.

138,260.—Standard Telephones and Cables Pty. Ltd.

Claim 1. A filament structure for electron discharge devices comprising filamentary means including at least one conductor strand, and means to increase the resonant frequency of said filamentary means including conductive means located adjacent said conductor strand.

PRODUCTION OF LETTERING FOR COMMERCIAL ART WORK.

138,211.—C. H. Bassett.

Claim 1. A process for preparing lettering for commercial art work comprising drawing by hand a plurality of letters, making a photographic negative of said letters, producing therefrom a separate positive print of each letter, assembling together a number of selected positive prints in desired order and spatial relationship with one another and photographing the said selected positive prints while they are so assembled.

PORTABLE BURGLAR ALARM.

137,737.—C. F. Lumley, N.Z.

A portable burglar alarm comprises a base secured to the bottom of a container, adapted to receive a suitable blank cartridge which is operated by a weight releasable by trip wires. A bell alarm may also be included so that upon release of the weight, contact is closed simultaneously with the operation of the firing pin.

HOLDER FOR TENNIS BALLS.

137,738.—S. L. Williams, Vic.

A ball holder comprises loops joined by a connecting member, the loops being of less diameter

than the balls, the distance between the loops being such that balls placed in each loop are pressed together and are adapted to be forced apart by insertion of a racquet or other article and act as gripping members to retain themselves and the holder on the racquet or article.

STAMPED CLINCH NUTS.

137,741.—Carr Fastener Co. of Aust. Ltd., S.A.

To provide an internally screw threaded stationary socket for reception of a fastening screw, a clinch nut is formed from relatively thin sheet metal by stamping or like actions, the main body of each nut being somewhat cup-shaped but having an annular bottom from which upstands a central hollow portion or barrel whose bore is screw threaded in order to receive a clamping or like screw, the nut also including means for retaining it to a plate or other member.

CONTROL DEVICE FOR HIGH-FREQUENCY ENERGY.

137,096.—A. H. Cooke, H. W. B. Skinner and A. G. Ward.

Claim 1. A device for controlling the flow of high-frequency energy at a junction between conductors (i.e., transmission lines and/or wave guides or sections of

a transmission line or wave guide) comprising a resonator adapted to be coupled to said conductors and associated with an envelope containing gas or vapour in which a glow discharge is excited by said energy whenever its power exceeds a predetermined level, said device serving during such glow discharge to vary the impedance at said junction and thereby to vary the flow of energy between said conductors.

TRANSMISSION CABLE ADJUSTER.

138,138.—Charles Somville.

Claim 1. Automatic regulation device for transmission mechanisms, specially for brake controls, characterized by the fact, that an element, forming part with the transmission and movable during the actuation of said transmission, causes under the effect of a helical guideway of its surrounding sleeve an angular movement of this sleeve controlling the rotation of a ratchet wheel forming nut for the regulation of the stroke of the transmission when the amplitude of the angular displacements of said element transgresses determined value.

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**LAMINATING THERMO-
PLASTIC RESINOUS
SHEET MATERIAL.**
138,139.—Boston Woven Hose and
Rubber Co.

Claim 1. A continuous method of laminating together and stress-relieving thermoplastic material, which comprises pressure-applying together two or more strips of thermoplastic material on to an endless moving metal belt, heating the thermoplastic material from both surfaces to a temperature at which it adheres to the belt and until a substantial amount of stress removal has occurred, then cooling the unitary sheet from both surfaces to a non-plastic condition, and then stripping it from the metal belt.

**SURFACE CONDITIONING
APPARATUS.**
138,144.—The Linde Air Products
Co.

Claim 1. An apparatus for flame-machining or flame-desurfacing the longitudinal surfaces of a metal body, including a floating frame supported between a pair of vertical pedestals, said frame being adapted to follow the transverse motion of a body passing through an opening in said frame, and flame-machining heads disposed about said opening far discharging a sheet-like gas stream in a zone extending across each longitudinal surface of said body

passing through said opening, characterized in that co-operating guide means are so arranged on said pedestals and on the respective outer edges of said frame, that the frame is upwardly removable from between said pedestals for access to the parts mounted thereon.

**MOP WRINGER ATTACHMENT
FOR BUCKET.**

138,207.—H. C. Blechmore.

Claim 1. A mop wringer attachment to a bucket consisting of two guide plates affixed in a bucket near the top thereof in parallel spaced relationship, each said guide plate having an inwardly and downwardly over the top of the bucket and then a traverse slot above said flange, a tongue near one end of said slot and an upwardly set key slot at the other end; a traverse roller having journal pins rotatably and slidably mounted in said traverse slots and a second "fixed" roller having journal pins rotatably held in one position by said tongues; two traverse bars mounted on the journal pins of the traverse roller, said traverse bars being shaped to project upwardly over the top of the bucket and then to extend across the bucket in parallel relationship to a position above the fixed roller where they are set inwardly obliquely and the ends

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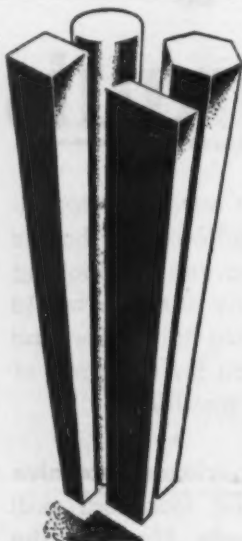
joined by a pivot pin; a lever mounted on said pivot pin, said lever being set outwardly and downwardly arcuately over the side of the bucket and having a straight down and inwardly set end pivoted to a bracket on the wall of the bucket; a second straight lever with an offset foot pedal on the bottom having its top end pivoted to said first lever at the arcuate bend thereof; a fulcrum link pivoted to the second lever and to said bracket; a tension coil spring anchored to said link and to said bracket; a handle mounted on said traverse bars.

**MOULD AND PATTERN
SEPARATING MECHANISM.**
138,180.—Herman Pneumatic
Machine Co.

Claim 1. Mechanism for separating moulds and the patterns on which they have been formed comprising means for moving one of a mould and the pattern on which it has been formed relatively to the other thereof to separate the mould and pattern, said means comprising two members movable in parallel paths, means for moving one of said members in its path, the other member being fluid operated to move in its path, means connected and mov-

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- LEADER—Freecutting for specialised purposes.
- GRADE CH2—Case hardening.

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- "MARBRITE" R4—Nickel Chrome Molybdenum—High Tensile.

AIRCRAFT STEELS—

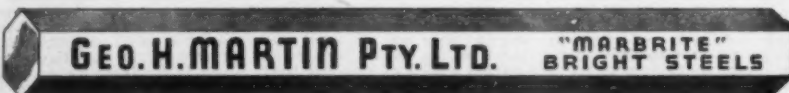
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able with the first mentioned member displacing fluid upon movement of the first mentioned member to operate the second mentioned member, said last mentioned means being constructed and arranged to displace fluid upon movement of the first mentioned member at such a rate as to effect movement of the second mentioned member at the same speed as the speed of movement of the first mentioned member. and connections between said members and the mould or pattern to be moved whereby separation of the mould and pattern is effected upon movement of said members.

Claim 17. Actuating mechanism comprising a smaller and a larger cylinder arranged in tandem, a hollow piston fitting in the smaller cylinder and having an extension extending into the larger cylinder, a piston fitting in the larger cylinder carried by the extension, the end of the hollow piston opposite the extension being closed, the hollow piston containing fluid, a source of gas under pressure, a connection from the source to the interior of the closed end of the hollow piston and a passage from the interior of the hollow piston to a point within the larger cylinder behind the piston fitting therein so that gas under pressure introduced into the hollow piston through the connection may force fluid through the passage and cause the fluid to move the pistons.

A SEALING COLLET.

138,191.—Robertshaw-Fulton Controls Co.

Claim 1. A sealing collet including a body member, a nose member mounted on said body member and co-operating therewith to form a chamber having a circumferential gap in its outer wall, a flexible diaphragm mounted in said chamber and projecting through said gap to make contact with a surrounding surface, and means for admitting fluid under pressure to the interior of said chamber.

HYDRAULIC LIQUID PUMP.

138,196.—Megator Pumps and Compressors Ltd.

Claim 1. A pump for delivering liquids characterised in the provision of a passage leading from the lower part of the pump to the outlet, the upper part of the pump being also connected with said outlet, either directly or through the medium of said passage, so as to permit the escape of air or vapour from the upper part of the pump casing out of the pump outlet and the upward flow of at least a part of the liquid and any solid matter which might otherwise accumulate in the lower part of the pump, along the passage and out of the pump outlet.

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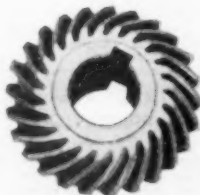
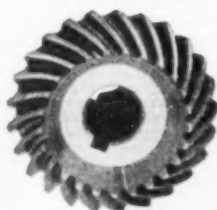
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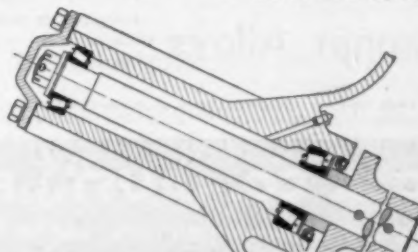
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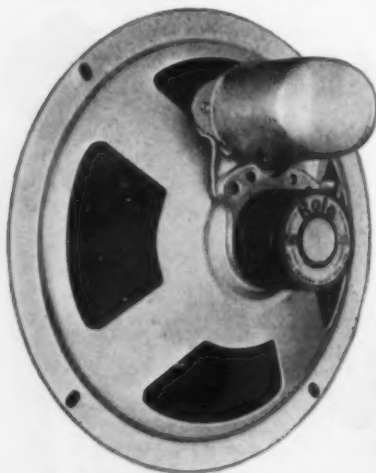
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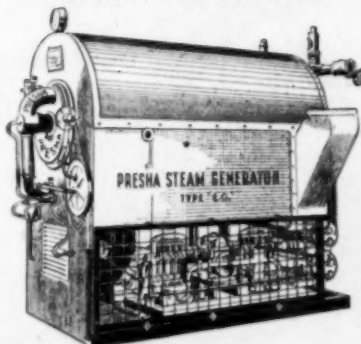
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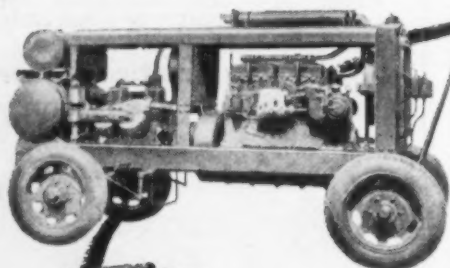
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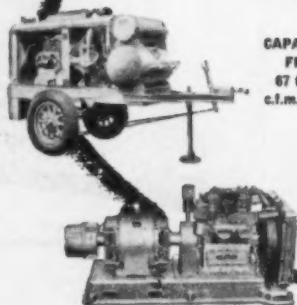
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(Turn to page 72.)



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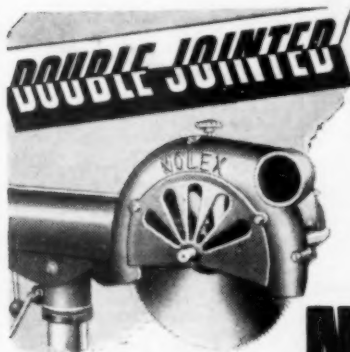
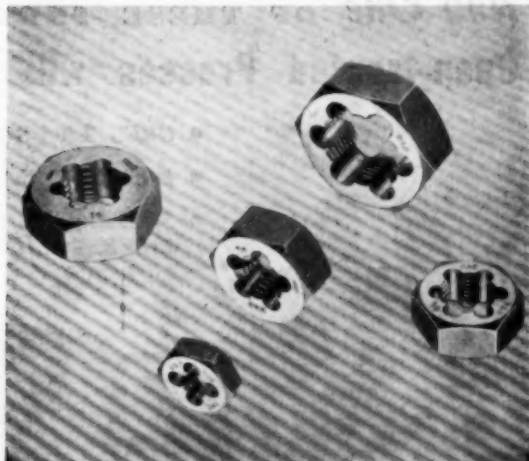
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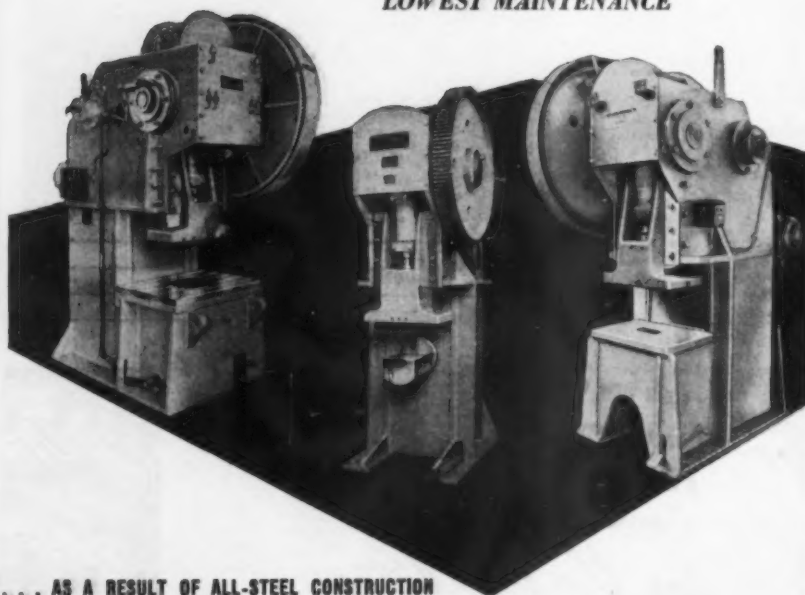
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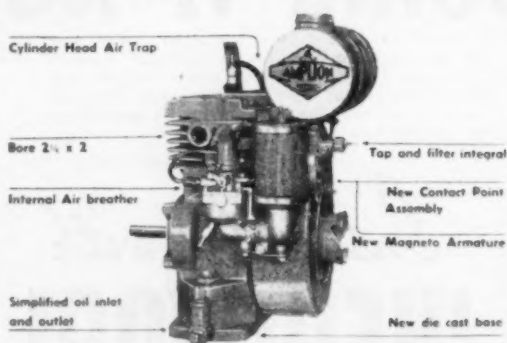
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Opens up an entirely new field for operating pumps,
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SPECIAL DISCOUNT TO MANUFACTURERS

Full details from

AMPLION (A'sia) PTY. LTD.

36-40 Parramatta Road, Camperdown. LA 2828.

(Continued from page 72.)

Post Office Scales and Weights (Sch. C.6023). W. Avery, £373/17/6.
Fork Lift Trucks and Accessories (Sch. C.6162). Lawton Industrial Trucks Ltd., £2,260/12/6.

Multi-Coin Attachments and Parts (Sch. C.5981). Hall Telephone Accessories Ltd., £13,755.

Testing Instruments, Exchange Service Types (Sch. C.6091). Victorian Meter Laboratory, £2,000; A. J. William, £506/18/-.
Cut Tracing Paper Sheets (Sch. C.6259). Max Wurcker (1930) Pty. Ltd., £254/8/-.

Felt Hats and Helmets (Sch. C.6313). United Felt Hats Pty. Ltd., £1,949/6/9.

Coin Attachments and Parts (Sch. C.6118). Whitley Engineering Co., £17,802/13/4.

Insulators (Sch. C.5999). M. I. Linsauer, £4,350.

Coin Attachments and Parts (Sch. C.6118). Reeve and Marshall, £1,426/18/4.

Transposition Fittings and Terminal Bands (Sch. C.6108). S. G. Sewell Pty. Ltd., £8,860.

Refrigerators, for Camping Parties (Sch. C.6264). R. Werner & Co. Pty. Ltd., £1,590.

Workshop Equipment (Sch. W.A. 36). McPherson's Ltd., £2,961/17/6.

DEPARTMENT OF REPATRIATION.

Toilet Requisites, Repat. Hospital Canteen. Johnson & Johnson Ltd., £400.

Tea Cups, Repat. Hospital, Concord. Cafe & Hotel Supplies Pty. Ltd., £255/1/9.

Rubber Goods, Repat. Hospital. Elliotts & Aust. Drug Pty. Ltd., £242/7/4.

X-Ray Requirements, Repat. Hospital, Hollywood, £10,237/17/3. Kodak (Aust.) Pty. Ltd.; £296/5/9. Watson, Victor Ltd.

Blankets, Repat. Hospital, Hollywood. Boans Ltd., £887/7/6.

Hypo Syringes, Repat. Hospital, Heidelberg. Ogden Industries Pty. Ltd., £2,241/6/1.

Artificial Eyes, Repat. Hospital, Hobart. Muir & Neal Pty. Ltd., £291/12/-.

Artificial Eyes, Repat. Branch Office, 8th. Melbourne. Dr. Dorothy Waugh, £250.

Cotton Wool, Repat. Hospital, Heidelberg. Joubert & Joubert Pty. Ltd., £644.

Wool, Repat. Hospital, Heidelberg. Patons & Baldwins Ltd., £234/17/-.

Leather, Repat. Hospital, Heidelberg. R. B. Stevens Pty. Ltd., £245/12/6.

Soap (Hard), Repat. Medical Institutions. Marnock Vale Soap Co., £612/6/-.

Artificial Eyes (Glass), Repat. Branch Office, 8th. Melbourne. Coles & Garrard Pty. Ltd., £200.

X-Ray Films, Developer, Fixer, Replenisher, etc., Repat. Hospital, Greenslopes. Kodak (A'asia.) Pty. Ltd., £3,673/0/11.

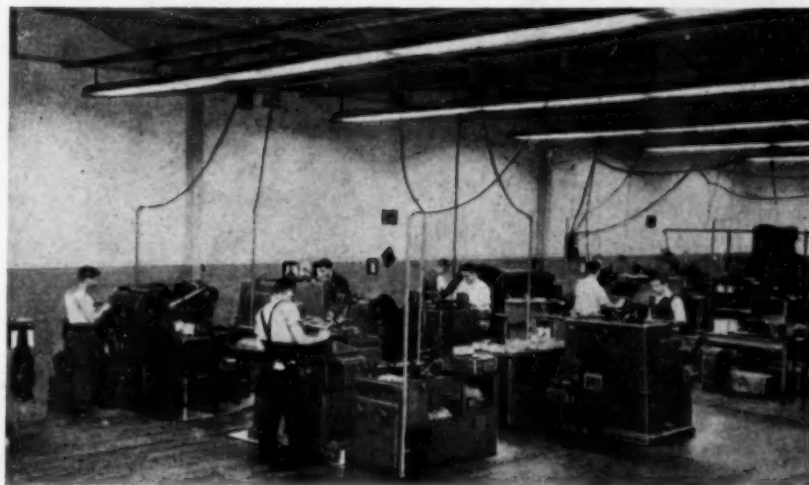
Impulse Timers, Repat. Hospital, Concord. Watson, Victor Ltd., £436/12/-.

Cotton Wool, Repat. Hospital, Concord. Joubert & Joubert Pty. Ltd., £644.

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mally associated with increasing light intensity.

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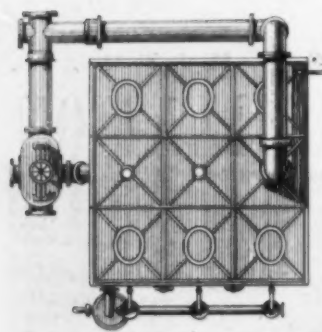
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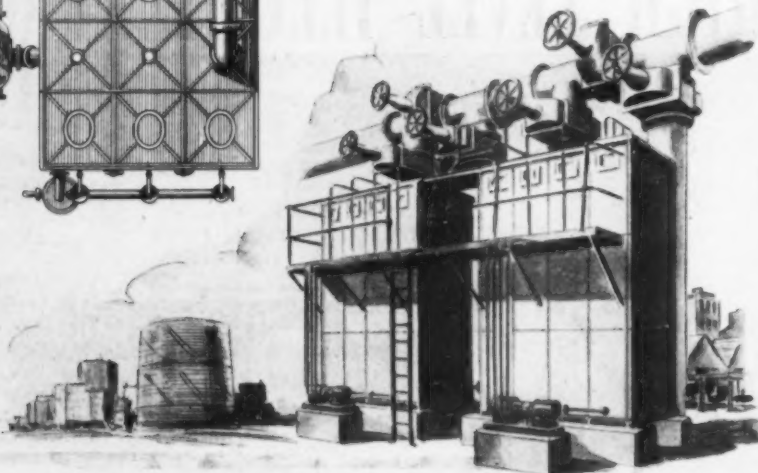
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Bird's eye view of Yesterday...



— worm's eye view of To-day

Much of the history of gas-washing practice had been written before the early-type washer seen in plan in the engraving was put into service. In this—the first multi-stage washer—the usual oblong vessel was divided into independent sections to improve the overall efficiency of the plant. Multi-stage washers are widely used to-day since the flexibility of design enables them to be used for widely differing conditions. The Balfour multi-stage washer shown can be designed for any required capacity. It has been used for ammonia and benzole washing, and with slight modifications can be adapted for gas dehydration and naphthalene removal.

The rule of thumb methods of the past

for calculating the type and size of ammonia washer required are no longer suitable for modern conditions. Accurate data relating to the ammonia content, the percentage of carbon dioxide present, and the probable temperature of the input gas must be available. Static Washers, Tower Scrubbers, Livesey, Rotary and Centrifugal Washers all have their place in the modern gas works, and operating conditions must be carefully studied in order to decide on the most suitable installation.

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Streptomycin, Repat. Hospital, Concord. Fredk. Stearns & Co. £1,493/15/-.

Occupational Therapy Requirements, Repat. Hospital, Concord. C. H. Slade & Co., £509/17/6; Delivery at Repat. Gen. Hospital, Concord. George Gull & Sons, £296/10/-; Patons & Baldwins Ltd., £280/11/5.

Rice Starch, Repat. Hospital, Concord. Swift & Co. Ltd., £311/7/4.

Disposable Tissues, Lady Davidson Home, Turramurra. British Patent Perforated Paper Co. Pty. Ltd., £294/6/6.

Wireless Headphones, Repat. Hospital, Concord. British General Electric Co. Pty. Ltd., £425/6/6.

Floor Polishing Machine, Repat. Hospital, Concord. G. T. McOnie & Co., £263/13/-.

Motor Mower, Repat. Hospital, Concord. Motor Tractor Pty. Ltd., £267/10/-.

Dettol, Repat. Hospital, Concord. Reckitt & Coleman (Aust.) Ltd., £565/16/9.

Medical Gases, Repat. Hospital, Concord, £1,150.

Toilet Requisites, Repat. Hospital, Canteen, Concord. Colgate, Palmolive Pty. Ltd., £375.

NEW SOUTH WALES

SYDNEY COUNTY COUNCIL.

Structural Steelwork, Pyrmont "B." £51,562. Bernard-Smith Pty. Ltd.

Oil Immersed Current Limiting Reactors, £35,546. The English Electric Company Limited.

Self Cleaning Circulating Water Screens, Pyrmont "B." Davison Engineering Company Pty. Ltd.

Mild Steel Dust Wetting Tanks and Associated Piping, for Ash and Dust Plant, £1,829. J. R. Pillars Pty. Ltd.

Switchgear, Metal Clad, 11,000 V., 250 MVA, £13,603. Westinghouse, Rosebery Pty. Ltd.

Concrete Structures for Coal and Ash Plant, Bunnerong "B." £207,075. McConnell Building Company Pty. Ltd.

Trench Excavators, Diesel or Petrol Engine Driven, Self Propelled, £6,306. Tutt-Bryant (N.S.W.) Pty. Ltd.

Cable and Pilot Cable, 33,000 V., Cable and Jointing Material, £96,384. Standard Telephones & Cables Pty. Ltd.; £96,307. Siemens (Aust.) Pty. Ltd.; £94,191. Enfield Cables (Aust.) Pty. Ltd.; Pilot Cable, £12,200. Lawrence & Hanson Electrical Pty. Ltd.; £12,200. A.W.A. Telcon Pty. Ltd.

Sub-station Relay Group Equip., for A.C. Signal System, £262. Standard Telephones and Cables Pty. Ltd.

Lightning Arresters, 132,000 V., £19,914. Westinghouse, Rosebery Pty. Ltd.

Calldozers, £295. Ruston and Hornsby (Aust.) Pty., £998; Britstand Distributors Ltd.

Wooden Telescope Ladders, three, £1,008. G. H. Olding & Sons Pty. Ltd.

Transformers, 13,500 kVA. Wilson Electric Transformer Co. Pty. Ltd.



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Cable, 33,000 V., £3,260. British Insulated Callender's Cables Ltd.; 15,000 V., £4,551. Lawrence and Hanson Electrical Pty Ltd.; 5,000 V., £6,127. W. T. Henley's Telegraph Works Pty. Ltd.

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Ready Mixed Concrete, 100 cu. yds., £367. Ready Mixed Concrete

Ltd.; £685. C.A.M. Premixed Concrete Engineering Pty. Ltd.

Galv. MS Tubing of various sizes, 90 m. in random and specified lengths; Galv. M.S. Tubulars and Galv. Wrought Steel or Malleable C.I. Fittings, 98,000, £18,755. Stewarts & Lloyds (Aust.) Pty. Ltd.

Multi-stage Pumps, elec. driven, 13, £10,647. McKinlay, Fletcher Pty. Ltd.

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Supplies of

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Write for New 24-Page Catalogue

Reinforcing Rods, M.S., £1,167.
A.R.C. Engineering Co. Pty. Ltd.
Pipes, Concrete, Class "S", 2,100
ft., £835. Humes Ltd.
Trench Excavators, chain and
bucket line, crawler tracked,
£23,417 (Plant Tender 351). Arm-
strong-Holland Pty. Ltd.; £15,354.
Tutt-Bryant Pty. Ltd.

Vertical Boom Ditcher, Barber-
Greene Model 44C, capable of cut-
ting trench 18 in. 2-1 in. and 24-
in. wide up to 8 ft. 3 in. deep, and
powered by Perkins PG 6 diesel
engine, £7,019. Tutt - Bryant
(Q'ld.) Pty. Ltd.

Cement lining of water mains,
12-in. pipes, 7/9½ per foot; 4-in.,
2/9 per foot (Con. W45/1950). Ce-
ment Linings Pty. Ltd.

QUEENSLAND

BRISBANE CITY COUNCIL.

Cement Mixers, "Lightning,"
with water cooled Westinghouse,
Rosebery engines, four, £704.
Lightburn & Co. Ltd.
Cement Mixers, "Champion,"
with "Champion" engines, five,
£1,130. Queensland Machinery Co.
Ltd.

DO YOU USE OUR
INQUIRY DEPARTMENT
SEE PAGE 36

AUTOMATIC BAR WORK STEEL OR BRASS

Capacity Available 1-2½ inches

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MW 2284

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Of Exceptional Quality

England's largest exporters of High Carbon Steel Wires will draw any special size or quality to suit your most exacting requirements.

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CURRENT TENDERS

NEW TENDERS

The following tenders have been called since our last issue. Current tenders which have been published in previous issues follow this section.

COMMONWEALTH

AUSTRALIAN ALUMINIUM PRODUCTION COMMISSION.
Hail Track Tippler, 140 deg. (alternatively 50 deg.), (Spec. M-26). Nov. 20.

DEPARTMENT OF SUPPLY.
Diesel Low-Loading Transporter, 20-ton, Purchase of. Oct. 20.

GOVERNMENT RAILWAYS DEPARTMENT.
Covered Goods Wagons. Extended to Nov. 21.
Steel Sections and Plates. Oct. 31.

NEW SOUTH WALES

DEPARTMENT OF MAIN ROADS.
Steel Bolts and Nuts, 42 tons. Nov. 9.

Steel Plates and Sections, 1,200 tons. Nov. 9.
Steel Reinforcing Bars, 1,300 tons. Nov. 9.

DEPARTMENT OF PUBLIC WORKS.

Elec. Heated Hotpress. Oct. 20.
Food Trolley. Oct. 20.
Heavy Bodies White Paint. Oct. 20.
Lightning Arrestors. Oct. 20.
Pedestal Stockpots (30 galls.). Oct. 20.
Portable Transformer Units. Oct. 18.
Spray Painting Outfit. Oct. 18.
Stocks and Dies. Oct. 20.
Tallowwood Flooring. Oct. 18.
Therapy Treatment Table. Oct. 18.

FORESTRY COMMISSION.

Louvres. Oct. 17.
Microtome Part. Oct. 17.
Motor Parts, 4 x 2. Oct. 17.
Overalls. Oct. 17.
Spark Plug Spanners, 13-16 in. Oct. 17.
Steel Spanners. Oct. 17.
Tappet Spanners. Oct. 17.
Tyre Chains. Oct. 17.
W.I. Spikes. Oct. 17.
Wheel Spanners, 1½ in. Oct. 17.

GOVERNMENT RAILWAYS DEPARTMENT.

Counter-type Bottle Cabinet (approx. 12 ft. long); Counter-

type Food Storage Cabinet (6 ft. long); Ice-cream Cabinet, 3-hole type (CE-1516). Oct. 28.
Pneumatic Digger Steels (CE-2279). Oct. 24.

MARITIME SERVICES BOARD.

Bar Bending Machine, portable, power-operated (Con. 5046). Oct. 30.
Single End Tenoning Machine (Con. 5047). Nov. 6.

METROPOLITAN WATER, SEWERAGE AND DRAINAGE BOARD.

M.S. elec. welded, cement lined pipe fittings, fabricated from Standard 20 ft. x 48 in. dia. M.S. Pipes, supplied by the Board (Job 2456). Oct. 31.

MISCELLANEOUS.

Accounting/Bookkeeping Machine, for City of Parramatta. Oct. 24.
House Service Meters (6,000), single phase, 240 volt, for Newcastle City Council. Oct. 30.
Metal-Clad Switchgear, 11,000-volt, and L. T., for Clarence River County Council (Spec. 95/50). Dec. 20.

Motor Grader (medium); Mechanical Loader, for Municipality of Gerringong. Oct. 24.

Stainless Steel Sheathed Overhead Pilot Cable, for Newcastle City Council. Nov. 6.

VICTORIA

CITY OF MELBOURNE.

Scrap Cable, Brass, Copper, Wrought, Burnt, and Cast Iron,

♦ ♦ SEE ALSO ♦ ♦
"LATE OPEN TENDERS"

Wire Rope, Pulleys, etc., Purchase of. Oct. 16.

DEPARTMENT OF PUBLIC WORKS.

Electric Passenger Lift, for Law Courts, Melbourne. Oct. 24.
Fuel Hot-water Service, for State School, Mitta Mitta. Oct. 31.

(Turn to page 79.)

NICHROME RESISTANCE WIRE THE WORLD'S BEST

Made in England

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For Measuring HOT and Cold Water
for all industrial purposes
IMMEDIATE DELIVERY

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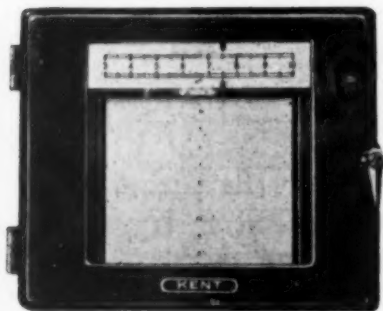
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Accurate measurement and controlled adjustment of heat can improve your product and lower plant operating costs by stepping up processing efficiency and reducing waste.

A Kent Multelec measures and controls temperature with laboratory accuracy under industrial conditions because it operates on the potentiometric principle. It has ample power to operate automatic control mechanisms and is ruggedly built for long life and a minimum of maintenance.

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Q'LD.—UNDERHILL, DAY & CO. PTY.
LTD., Brisbane.
N.Z.—CORY-WRIGHT & SALMON
LTD., Wellington and Auckland.



NEW TENDERS - Contd.

Gas Hot-water Service, for
Technical School, Sale. Oct. 24.
Heating and Hot-water Equip-
ment, for Consolidated School,
Pakenham. Oct. 17.
Heating Piping and Oil Fired
Boiler, for Gordon Institute of
Technology, Geelong. Oct. 17.
Kitchen Fans, for Greaswell
Sanatorium, Mont Park. Oct. 17.
Septic Tank and new Water
Service, for Healesville. Oct. 17.
Septic Tank System, for State
Schools, Birregurra. Oct. 17.
Workshop Equipment, for Tech-
nical School, Preston. Oct. 17.

DEPARTMENT OF SUPPLY. Automatic Ice Cream Machines.

Nov. 14.
Pumpless Petrol Irons and
Spare Parts, Purchase of. Oct. 24.

GRAIN ELEVATORS BOARD.

Overhead Crane Type Runways,
Structural Steel supplied. Nov. 27.

GOVERNMENT RAILWAYS DEPARTMENT.

Cable Clamps and Lugs. Oct.
25.
Galvanised Steel Turnbuckles.
Oct. 18.
Lead Acid Batteries. Nov. 15.
Overhead Runway Trolleys. Oct.
18.

Printing Machine, Quad Crown 2-Revolution. Nov. 8.

Stranded Copper Conductors.

Oct. 18.
Sump Pump, complete with
Motor and Starter. Oct. 18.

MELBOURNE AND METRO- POLITAN BOARD OF WORKS.

Air Compressor, twin cylinder,
complete with Automatic Un-
loader and V-belt drive, and after-
cooler unit. Oct. 16.
C.I. or Asbestos Cement Pres-
sure Pipes, 2 in. dia., 30,000 lin. ft.;
4 in. dia., 100,000 lin. ft.; 6 in. dia.,
30,000 lin. ft. Nov. 8.

POSTMASTER-GENERAL'S DEPARTMENT.

Cafeteria Equipment (Sch. V-
387). Oct. 17.
Scrap Lead, Purchase of (Sch.
V.403). Oct. 17.
Scrap Mixed Metals, Purchase
of (Sch. V.410). Oct. 24.
Second-hand Car Batteries, Pur-
chase of (Sch. V.411). Oct. 24.

MELBOURNE AND METRO- POLITAN TRAMWAYS BOARD.

Blowout Coils, for Line
Breakers, for Tram Cars (Tender
1598). Oct. 30.

(Turn to page 80.)

THE PINNACLE OF ACHIEVEMENT IN AUTOMOTIVE VALVE ENGINEERING

D.E.C. BRAND AUTOMOTIVE
STATIONARY AIRCRAFT

VALVES

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27 BOURKE ROAD,
ALEXANDRIA, N.S.W. TEL. MX 1151

NEW TENDERS - Contd.

Spacing Pieces, for Line
Breakers, for Tram Cars (Tender
1599). Oct. 30.

Insulation Plates, for Line
Breakers, for Trams (Tender
1601). Oct. 30.

Vitreous Enamelled Resistance
Tubes, for Line Breaker, for Tram
Cars (Tender 1597). Oct. 30.

**STATE ELECTRICITY COM-
MISSION.**

Copper Conductors and Trolley
Wire. Nov. 29.

Gal and Black Steel Tubes.
Oct. 25.

Paper and Varnished Cambric
Insulated Cable. Feb. 7.

Sleeper Plates, for Movable
Rail and Dredger Tracks. Nov. 8.

Steel Forms and Concrete Buck-
ets. Nov. 15.

**STATE RIVERS AND WATER
SUPPLY COMMISSION.**

12 Cusec Centrifugal Pump. Oct.
31.

16-run Combines (2). Oct. 31.

35 H.P. Pneumatic Tyred Trac-
tors (6). Oct. 31.

65 H.P. Diesel Engine at Jung
Dooen Pumping Station. Oct. 31.

Pneumatic Tyred Front End
Tractor Loader. Oct. 31.

MISCELLANEOUS.

Bitumen, 56 tons, 80/100. Oct.
25.

Bitumen; Bitumen Emulsion;
Kerosene; Lubricating Oils;
Petrol; Annual Contract, for City
of Richmond. Oct. 18.

Portable Air Compressor, for
City of Coburg. Oct. 23.

Pressure Pipes, 11,380 lin. ft.
12 in. dia.; 103,720 lin. ft. 8 in. dia.,
for Westernport Water Works
Trust. Oct. 18.

QUEENSLAND

**STATE ELECTRICITY COM-
MISSION.**

Oil Storage Tanks (Spec. 242).
Nov. 22.

**IRRIGATION AND WATER
SUPPLY COMMISSION.**

Crane, Rubber-tyred, Tractor-
type (1). Nov. 3.

Diesel Generators, 100 KVA, 415-
volt, 3-phase, (2). Nov. 3.

Rock Drills (30), approx. weight
45-50 lbs. Nov. 3.

Tipping Trucks or Rock Bug-
gies, Diesel Steel-bodied, approx.
6 cub. yd. cap. (12). Nov. 3.

Welding Sets, portable internal
combustion, 300 to 400 amp., (2).
Nov. 3.

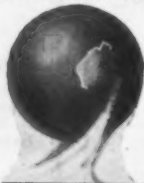
(Turn to page 81.)

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Air conditioning can keep raw materials uniform, too. And contribute to a more uniform product. Textiles, pharmaceuticals, paper and sweets (to mention a few) may be affected adversely by fluctuating temperatures and humidities. They may turn soft . . . may take on moisture . . . may "spoil."

Over-all, air conditioning removes many of the variables previously introduced by the passing of the seasons, hot spells, rainy spells and changing winds in industrial atmospheres. Why not let a Carrier representative explain the definite advantages and savings to be gained by using Carrier Air Conditioning?

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NEW TENDERS - Contd.

TASMANIA

HYDRO-ELECTRIC COMMISSION.

Crusher Plant Feeders (C.E. 213). Nov. 22.
Pneumatic Concrete Placing Gun (C.E. 190). Nov. 15.

CURRENT TENDERS

The following tenders have appeared in previous issues and are still current.

COMMONWEALTH

POSTMASTER-GENERAL'S DEPARTMENT.

Bimotonal Switch Wiper Assemblies and Parts (Sch. C. 6436). Dec. 19.
Cable Identification Sets (Sch. C. 6409). Oct. 17.
Communication System between Sydney and Melbourne (Spec. C. 8157). Extended to Jan. 18, 1951.
Distributing Frames and Terminal Equipment (Sch. C. 6378). Oct. 19.
Eyebolts and Eyebolt Lugs (Sch. C. 6415). Oct. 19.
Junction Cable Carrier Telephone Equipment (Sch. C. 6425). Oct. 19.
Induction Coils (Sch. C. 6391). Nov. 2.
Intercommunication Telephones (Sch. C. 6384). Nov. 2.
Interruption Cable (Sch. C. 6417). Nov. 9.
Jacks and Number Plates (Sch. C. 6359). Oct. 19.
Mechanics Tools, Gauges, etc. (Sch. C. 6411). Nov. 23.
Files and Screwdrivers (Sch. C. 6418). Nov. 30.
Plugs (Sch. C. 6363). Oct. 19.
Receivers and Parts (Sch. C. 6256). Dec. 7.
Relay Strips and Mountings (Sch. C. 6419). Dec. 7.
Resistors and Reactances (Sch. C. 6437). Dec. 19.
Spanners (Sch. C. 6434). Dec. 19.
Sub-Station Accessories (Sch. C. 6420). Dec. 7.
Switchboard Keys (Sch. C. 6404). Nov. 16.
Telephone Meters (Sch. C. 6390). Nov. 9.
Teletypewriter Tables and Silence Covers (Sch. C. 6439). Oct. 31.
Television Installation at Sydney (Sch. C. 6423). Nov. 21.
Tools-Adjusters and Benders (Sch. C. 6429). Dec. 14.
Tools, for Mechanics, Exchange and Sub-station Maintenance (Sch. C. 6416). Nov. 30.
Transformers (Sch. C. 6396). Nov. 16.

AUSTRALIAN ALUMINIUM PRODUCTION COMMISSION.

Apron Feeder, 75 tons per hour (Spec. M.25). Nov. 13.
Diesel Motor Trucks, heavy-duty (Spec. M.24). Nov. 13.

(Turn to page 82.)



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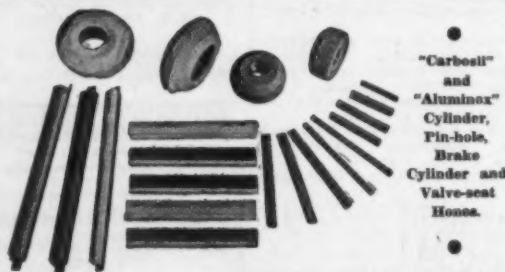
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CURRENT TENDERS — contd.

Inclined Belt Conveyors (2), galleries and supporting structures (Spec. M.20). Oct. 16.

Kier Slurry Pumps (Spec. CH. 9). Nov. 13.

M.S. Round, 3,000 lengths, each 4 ft. 1 in. x 5 in. dia. (Spec. M.23). Oct. 23.

Switchyard Steel Rails, 27 tons (Spec. E.28). Nov. 13.

Transformer, single-phase, 15 K.V.A. (Spec. E.29). Nov. 6.

Travelling Weighing Hopper and three (3) cwt. Platform Scales (Spec. M.21). Oct. 16.

Water Piping, 16,300 ft. (from 6 in. to 3 in.). (Spec. C.7). Nov. 13.

GOVERNMENT RAILWAYS DEPARTMENT.

Diesel Electric Locomotives. Nov. 14.

Diesel Tractors and Earth-Moving Equipment. Oct. 24.

Horizontal Boring Machine. Dec. 12.

Open Goods Waggon; Freight Car Bogies. Extended to Nov. 21.

Railway Wheel and Axle Lathes. Nov. 14.

Water Tank Wagons. Nov. 7.

DEPARTMENT OF CIVIL AVIATION.

Approach Light Fittings, high intensity (Sch. 308). Nov. 14.

Code Senders, Automatic (Sch. 313). Oct. 24.

Insecticidal Sprayers, Power-operated (Sch. 312). Oct. 24.

Rotating Light Beacons, for Airport (Sch. 307). Nov. 14.

DEPARTMENT OF WORKS AND HOUSING.

Fuel-Burning Cooking Range, for Riverside Works Hostel, Canberra. Oct. 17.

Laundry Coppers, steam heated (88), for Dept. Store. Oct. 17.

Passenger Elevator, Electrically-driven, for Telephone Exchange, Hamilton. Oct. 17.

Sanitary Fittings and Sundries, for Administrative Offices, Canberra. Oct. 17.

Stone Planing Machines (4), for Stone Yard, Canberra. Dec. 12.

Transformers (8), (4) 100 K.V.A., and (4) 50 K.V.A., for Canberra. Oct. 24.

DEPARTMENT OF SUPPLY AND DEVELOPMENT.

Bronze Propellers (4), approx. total of 7 tons; Steel Tailshafts (5), approx. total of 6 tons, Purchase of. Oct. 20.

STATES

NEW SOUTH WALES

GOVERNMENT RAILWAYS DEPARTMENT.

Air Break Isolating Switches (241), Outdoor Manually and Power Operated; current ratings, 300-1,500 amperes at voltages 55 k.v. to 132 k.v. (Spec. 1270). Nov. 15.

Disconnecting Switches (Quot. CE-1299). Nov. 23.

Cable, Cadmium Copper Stranded, hard drawn (Quot. CE-1438). Oct. 25.

Coal Weighers (Spec. 1274). Nov. 8.

Electric Overhead Travelling Crane (75 ton), (Spec. 504). Extended to Nov. 1.

Sawdust, Annual Contract (Sch. 146). Dec. 31.

Transformers (24), 2 KV, 415 v., ranging from 50 KVA to 500 KVA (Spec. 1273). Oct. 25.

DEPARTMENT OF MAIN ROADS.

Vehicle Grids. Oct. 10.

DEPARTMENT OF PUBLIC WORKS.

Crushing, Screening and Storage Plant, for Clarence Harbour Works (Spec. 104-49/50). Oct. 23.

(Turn to page 83.)

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CURRENT TENDERS - contd.

Derrick Crane, electrically driven, 40-ton, stiff-leg, for Clarence Harbour Works, Supply and delivery (No. 98-49/50). Oct. 16.

Elevated Tank, M.S., 50,000 gallons, Supply and erect, for Howlong Water Supply (Spec. 46-48/49). Oct. 30.

Pumping Plant, Electrically Driven (Spec. 106-49/50), for Forbes Water Supply Augmentation. Oct. 23.

Pumping Plant, Electrically Driven (Spec. 117-49/50), for Alstonville Water Supply. Nov. 20.

Regulating Transformers, 11-6.6 KV, for Southern Electricity Supply. Nov. 13.

Sewerage Pumping Plant, Electrically Driven, for Murwillumbah Sewerage, Supply and delivery (Spec. 28-49/50). Oct. 23.

Transformers, 132-66/11 KV, 27. MVA (2), for Southern Electricity Supply. Nov. 11.

DEPARTMENT OF SUPPLY AND DEVELOPMENT.

All Geared Gap Bed Lathes. Oct. 17.

Automatic Telegraph Equipment. Oct. 19.

Bunting. Oct. 17.

Gauges. Oct. 19.

Lighthouse Optical Equipment. Oct. 20.

Surface Tables. Oct. 19.

METROPOLITAN WATER, SEWERAGE AND DRAINAGE BOARD.

Automatic Inlet Control Valves (5), and Control Mechanisms (Job 2452). Oct. 17.

C.I. Fenslocks (3), 10 ft. diameter (Job 2447). Extended to Oct. 31.

Platform Holsts, Control Gear, etc., 4,000 lb. min. cap. (2, 4, or alternatively 6), Supply and instal (P.T. 385). Oct. 31.

Sawdust and Shavings Extractor, maximum cap. 1-ton per hour; Incinerator Plant, capacity approx. 5 tons per day, for Warragamba Dam (P.T. 378). Oct. 17.

Steel Sills, 320-ton cap. Supply and erect, at Warragamba Dam (Job 2453). Oct. 31.

STATE CONTRACTS CONTROL BOARD.

Steel Shelving. Extended to Oct. 17.

SYDNEY COUNTY COUNCIL.

Circuit Breaker Switching Equipment, low voltage, air or oil (Spec. 1456). Jan. 18.

Oil Emerged Fuse Switches, 11,000 volt. (Spec. 1421). Extended to Oct. 19.

Solenoid Operating Mechanisms, for oil circuit breakers (Spec. 1452). Oct. 26.

Storage Batteries and Battery Charging Equipment, for Substations (Spec. 1446). Oct. 26.

WATER CONSERVATION AND IRRIGATION COMMISSION.

Steelwork, for Screen Structures, for Hydro-electric Outlets at Burrinjuck Dam. Oct. 19.

MISCELLANEOUS.

Armstrong - Holland Bulldog Patrol Grader, Purchase of, from Shire of Wingecarribee. Oct. 25.

Carbonising Plant, consisting of vertical retorts, for Bathurst City Council. Oct. 31.

Crawler Tractor of approx. 40 h.p., fitted with Angledozer; Tipping Trucks, 5-ton (2), fitted with 6 cub. yd. cap. bodies, for Shire of Wingecarribee. Oct. 25.

Excavator, 1 or 1 cub. yd.; Float or Transporter Unit; Auto Patrol Grader; Wheel Scoops (2); Steel Bodies, Tipping Motor Trucks, 3-ton (4); Stone Breaker, electrically driven, for Municipality of Bankstown. Oct. 23.

Medium Duty Motor Patrol Graders (2); Pneumatic Tyred Drawn Grader; "Ferguson" or similar Tractor, for Shire of Boorowa. Oct. 19.

Motor Road Graders (3), Diesel-powered and weighing between 15,000 and 18,000 lbs., for Shire of Goobang. Oct. 18.

Motor Vehicle, petrol-driven, 4/5 ton, for Mid-Lachlan County Council. Oct. 16.

Oil Circuit Breakers (8), 500 MVA, 33 KV, for Greater Wollongong City Council. Extended to Oct. 24.

Outdoor Oil Circuit Breakers (11), 23,000 volt., for Newcastle City Council. Oct. 30.

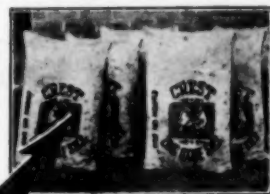
Pneumatic-tyred Grader-Loader or Loader-Doser Combination, for Municipality of Lane Cove. Oct. 19.

Steel Frames, for Buildings, for Shire of Sutherland. Oct. 23.

Track-type Waggon (10), new or good second-hand, approx. 6

(Turn to page 84.)

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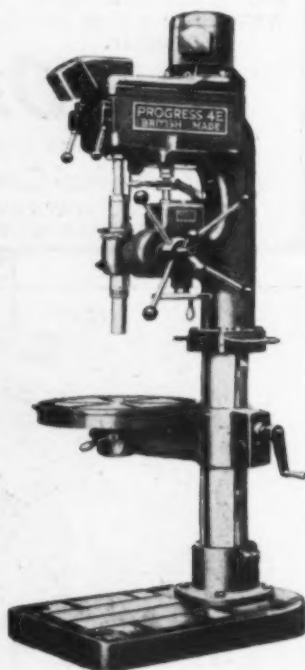
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CURRENT TENDERS - contd.

tin cap., for Snowy Mountains Hydro-Electric Authority. Oct. 17.
Transformers (2), 10,000 K.V.A., 33,000-volt., and (3), 5,000 K.V.A., 33,000-volt., for Newcastle City Council. Oct. 30.

Water Pumping Units (2), electrically driven, for New Lambton (Con. 676); Water Pumping Units, electrically driven (2), for Violet Town (Con. 677), for Hunter District Water Board. Extended to Oct. 18.

VICTORIA

GOVERNMENT RAILWAYS DEPARTMENT.

Auxiliary Transformers, 50 and 200 K.V.A. Oct. 25.

Bare Hard Drawn Stranded Copper Conductors. Nov. 8.

Copper Plates. Nov. 1.

Disc Insulators. Oct. 18.

Galvanised Fencing Wire. Nov. 1.

Road Motor Chassis, 6-ton. Oct. 25.

Roller Bearings. Nov. 1.

Steel Kit Boxes. Oct. 18.

Weldless Mild Steel Angle Rings. Oct. 25.

CITY OF MELBOURNE.

Fabricated Structural Steelwork (Spec. 736/E). Extended to Nov. 6.

Street Lighting Lanterns (Spec. 735/E). Dec. 4.

DEPARTMENT OF PUBLIC WORKS.

Sector Type Spillway Gates (8), 26 ft. x 23 ft., for Somerset Dam. Nov. 27.

DEPARTMENT OF WORKS AND HOUSING.

40-ton Railway Weighbridge, Supply and delivery, for Mulwala. Oct. 24.

Boiler House Access Galleries, for Parkville. Oct. 17.

Steam Piping, for various States (107,666 ft.). Oct. 17.

Steelwork and Brasswork, for Cable Supports, for Melbourne. Oct. 24.

Steelwork and Brasswork, for Cable Support, for Melbourne. Extended to Oct. 24.

Structural Steel Work, for Essendon. Nov. 14.

MELBOURNE AND METROPOLITAN BOARD OF WORKS.

Crushing Plant (conveyors, elevators, screens, crushers and feeder). Oct. 24.

Pressure Pipes, c.i. or asbestos cement: 3-in. dia., 30,000 lin. ft.; 4-in. dia., 100,000 lin. ft.; 6-in. dia., 50,000 lin. ft. Nov. 8.

MELBOURNE AND METROPOLITAN TRAMWAYS BOARD.

Heavy Duty Buzzer, 12-in. (Tender 1596). Oct. 18.

(Turn to page 85.)

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CURRENT TENDERS - contd.

MELBOURNE HARBOUR TRUST.

Boiler Feed Pumps, steam-driven (6). Oct. 27.
Mobile Crane (3 ton), slewing type. Oct. 20.
Mobile Crane (10 ton), slewing type, with 40 ft. jib. Oct. 20.

POSTMASTER-GENERAL'S DEPARTMENT.

Rubber Knee-Boots (Sch. V.382). Oct. 24.

STATE ELECTRICITY COMMISSION.

Aerial Hopeway, electrically driven (Spec. 50-51/108). Oct. 25.
Bore Sluice Valves, 42 inch (Spec. 50-51/107). Oct. 18.
Braided Aerial Cable, paper double (Spec. 50-51/101). Oct. 25.
Centrifugal Pumps, electric motor driven (Spec. 50-51/63). Oct. 18.
Drilling Machines (Spec. 50-51/114). Oct. 25.
Flanged Steel Pipes and Fittings (Spec. 50-51/64). Oct. 18.
Metal Plant Switchgear and Accessories, 20 KVA, 25 Cycles (Spec. 50-51/100). Nov. 22.
Outdoor Switches and Accessories, 22 kV and 66 kV (Spec. 50-51/44). Nov. 1.
Trailing Cable, V.R.L. T.R.C.S., 6.6 K.V. (Spec. 50-51/68). Nov. 15.

MISCELLANEOUS.

Diesel Road Grader, tandem drive, Supply and delivery for Shire of Birchlip. Oct. 16.
Electric Welder, d.c., portable engine-driven; Excavator, 3/8 cub. yd., complete with back trencher, dragline attachments and spare parts; front end loader; hydraulic tip truck, 4-yard, for Geelong Water Works and Sewerage Trust. Oct. 26.
Filtration and Chlorination Plant, for Shire of Birchlip. Oct. 16.
Pipes, c.i., asbestos cement, or r.c., for Municipality of Ringarooma. Oct. 21.
Traffic Control Signals, for City of Essendon. Oct. 16.

QUEENSLAND

BRISBANE CITY COUNCIL.

C.I. Water Pipes, 6 in. and 4 in. nominal dia., with spigot and socket ends, suitable for rubber ring jointing. Oct. 20.
Piping, h.p. steam, feed, drain, and blowdown, valves and lagging. Oct. 20.
Ring Main Switchgear, 11 kV. Oct. 20.
Stationary Batteries and Charging Equipment (150 amp. hours). Oct. 20.
Steel Storage Reservoir (1,000,000-gallon), Supply and erection, for Grovely (Con. W60/1950). Oct. 20.

DEPARTMENT OF CO-ORDINATOR GENERAL OF PUBLIC WORKS.

Spillway Gates (8), Sector Type, 28 ft. x 23 ft., for Somerset Dam. Nov. 27.

IRRIGATION AND WATER SUPPLY COMMISSION.

Flow Metering Equipment, Recording and Integrating, for Clare (Job 1668). Oct. 30.
Shovels, 1 1/2 cub. yd. (4), new or re-conditioned. Nov. 3.
Tracked Crane, with 70 ft. boom, to lift 15 cwt. at 25 ft. radius, and complete with 1 cub. yd. Dragline Equipment. Nov. 3.

STATE ELECTRICITY COMMISSION.

Air Break Switches and Earth Leakage Protection Equipment (Spec. 223). Oct. 25.
Coal Burning Gas Producers (3), (Spec. 227). Oct. 18.
Coal Burning Gas Producers (3), (Spec. 228). Oct. 18.
Crane Runway (Spec. 172). Nov. 15.
Distribution Materials (Spec. 245). Nov. 1.
Fabricated Steelwork (Spec. 235). Oct. 18.
Hard Drawn Bare Copper Cable (Spec. 243). Oct. 25.
Hard-Drawn Bare Copper Cable (Spec. 246). Nov. 8.
Insulators and Insulator Ironwork (Spec. 244). Oct. 25.

(Turn to page 86.)

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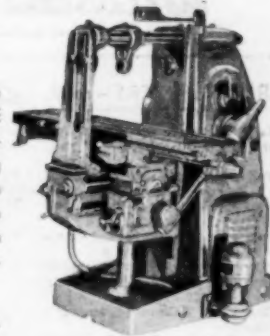
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CURRENT TENDERS — contd.

Main Transformers, 122, 66, 22, 11 and 6.5 kV. (Spec. T/F.2). Dec. 13.

Switchgear: (122, 66, 22, 11 & 5 kV), Relays and Carrier Current Communication Equipment (Spec. T/F.3). Dec. 13.

Transformers, 3 phase and single phase (Spec. 241). Dec. 6.

Turbo-Alternators (2), water-driven, 11,000 V., 18,000 kW (Spec. T/F.1). Nov. 29.

Water Tube Boilers (Spec. 224). Oct. 25.

Wood Burning Gas Producers (Spec. 247). Dec. 20.

STATE STORES BOARD.
Steel Wire Rope. Oct. 31.

MISCELLANEOUS.

Alternators (3), Crude Oil Engine Driven, 100 h.p. engine; Switchboard, Air Receiver, Compressor and Spares, for Cairns Regional Electricity Board. Oct. 24.

Plan Printing Machines, for Cairns Regional Electricity Board (Con. L50/21). Jan. 23.

Switchgear, Relays and Instruments, for Cairns Regional Electricity Board. Dec. 6.

WEST AUSTRALIA

GOVERNMENT TENDER BOARD.

Forging Machine, for Railways. Nov. 16.

Fork Lift Trucks, for State Brickworks. Extended to Oct. 19.

Pumping Machinery, for Kalamund Pumping Station (Sch. 499A). Nov. 9.

Steam Raising Plant, for Col-He Power Station. Dec. 14.

Steel Sections, for Railways. Nov. 18.

Transformer (1,500 KVA), for S.E.C. Oct. 19.

NEW ZEALAND

HYDRO ELECTRIC DEPARTMENT.

Control and Protective Equipment, for Cobb River Station, Nelson district (Quot. 2060). Oct. 25.

Filtration Plant at Tauranga Borough Council. Nov. 28.

Switchgear, steelwork. 110 kV. Nov. 14.

Synchronous Condensers (2), 30,000 KVA. Nov. 21.

Transformer Bank and Spare Unit, 50 MVA, 230/110/11 kV. Nov. 7.

MISCELLANEOUS.

Cable, 3-core, 6,600 V. Oct. 12.

Filtration Plant (Con. 126). Nov. 28.

Accepted Tenders

COMMONWEALTH

DEPARTMENT OF SUPPLY.

Polished Rice (File No. 50/682). Robert Harper & Co. Ltd., 1881/13/11.

Steel Trays (File No. 50/3331). Art Metal (Aust.) Pty. Ltd., £200.

D.D.T. Spraying Emulsion (File No. 50/1768). Taubmans Ltd., £769/16/8.

Paint, Full Gloss (File No. 50/2767). Lewis Berger & Sons (Aust.) Pty. Ltd., £481/17/11.

Steel Shelves and Fittings (File No. 50/3290). Art Metal (Aust.) Pty. Ltd., £731/10/-.

Paint, Hull, White Gloss (File No. 50/1685). Taubmans Ltd., £4,462/10/-.

Engraving Machine (C/4/313/239). Horrocks, Roxburgh, £642/14/6.

Stainless Steel Bar (C/4/371/274). Commonwealth Steel Co. Ltd., £878/16/- and £385/17/4.

Processed Cheese (C/4/104/566). Australian Dairy Produce Board, £366/12/-.

Tomato Sauce (C/4/106/560). Henry Williams & Sons Pty. Ltd., £397/7/8.

Electric Motors (C/4/307/292). Anderson's Electric Motor Services Pty. Ltd., £248/8/-.

Brass Fittings, for Private Mail Bags (C/4/366/143). A. G. Douglas, £300.

Stainless Steel Sheet (C/4/371/276). Commonwealth Steel Co. Ltd., £8,241/2/7.

Washing Machines, for Department of Immigration (27,865). Levin & Co. Pty. Ltd., £392/17/6.

Canteen Equipment, for Stores and Transport Branch. Department of Supply, £212.

Iron and Steel (File No. 50/3661). John Lysaght (Aust.) Pty. Ltd., £299/14/11.

Calcium Chloride (File No. 50/2379). Alex. Minter & Co. Pty. Ltd., £210/2/5.

Spares, for Transformers (File No. 50/3425). A.W.A. (Aust.) Ltd., £2,206/4/11.

Fire Extinguishers (File No. 50/3777). Wormald Bros. (East) Pty. Ltd., £487/10/-.

Black Stripe Ticking, 58 in. (File No. 50/3003). Chapmans Ltd., £341/8/-.

"Britannia" Alkaline Nickel Iron Battery (File No. 50/3109). Masse Batteries Pty. Ltd., £347/14/8.

Rolls Cloth, Abrasive, Durexsil (File No. 50/3128). McPherson's Ltd., £343/1/5.

Stone, Screw-stoppered Bottles (File No. 50/3194). R. Fowler Ltd., £244/3/-.

Oilskin Clothing (File No. 50/3513). Brimsby Waterproof Co. Pty. Ltd., £1,890/12/6.

Flattening Deckhand, White Fire Retardant Paint (File No. 50/2296). Taubmans Ltd., £3,408/15/-.

Utilvan (File No. 50/2988). Nuffield (Aust.) Pty. Ltd., £847/9/4.

Welding Plant (File No. 50/3600). Lincoln Electric Co. (Aust.) Pty. Ltd., £290/19/3.

Spares, for Wisconsin Stationary Engine (File No. 50/3031). Tutt-Bryant (N.S.W.) Pty. Ltd., £984/11/3.

Units, X-Ray and Tube Stands (File No. 50/1140). Ultrays Pty. Ltd., £1,072/10/-.

Motor Alternators (File No. 50/3144). W. & H. Whitehurst, £285.

Tomato Paste (File No. C/4/116/92). O. T. Ltd., £1,215/8/-.

(Turn to page 88.)

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Accepted Tenders—Continued

Dining Chairs (File No. C4/168/84). Melbourne Chair Co. Pty. Ltd., £13,950.

Dining Chairs (File No. C4/168/84). Rozelle Wood Products Pty. Ltd., £8,775.

Table Knives (C4/175/145). H. E. Davis Pty. Ltd., £1,600; Hackers Silver Plate Manufacturing Co., £430.

Cutlery (C4/175/145). Myttons Ltd., £980/12/-.

Alarm Clocks (C4/176/83). S. Smith & Sons (Aust.) Pty. Ltd., £322/18/4.

Medium Leather Strap Hides (C4/200/19). George Pizzey & Son Pty. Ltd., £271/12/1.

Australian Blue Ensigns Flags (C4/202/15). S. Walder Pty. Ltd., £445/7/10.

Boxing Gloves (C4/209/1). Hedley's Sporting Goods Pty. Ltd., £546/15/-.

Fibre Hospital Mattresses (C4/250/90). Queensland Industrial Institution for the Blind, £3,916/13/4; J. Wilson Ltd., £8,012/10/-; C. C. Rawson Ltd., £9,447/1/-; Bruce Pie Industries Ltd., £943/16/-.

Fitting Cuffs to Jumpers (C4/252/51). H. G. Bridger, £321/12/-; A.M.F. Collar Badges (C4/253/40). K. G. Luke Pty. Ltd., £1,600/15/9.

Headress Badges (C4/254/40). Amor Pty. Ltd., £2,808/12/-.

Black Sewing Thread (C4/262/10). Bryce & Duncan Pty. Ltd., £362/11/7.

Hose Assemblies (C4/301/74). Patons Brake Replacements Pty. Ltd., £1,422/3/9.

Pad Engine (C4/301/75) Swift Rubber Co. Pty. Ltd., £468/15/-.

Peeling Vegetable Machines (C4/4307/235). Tallents & Knapman Pty. Ltd., £3,073/17/6.

Single Baking Ovens (C4/307/242). British General Electric Co. Pty. Ltd., £3,828.

Lighting Set (C4/307/272). F. W. Davey & Co. Pty. Ltd., £376.

Tolerberk Mixer (C4/307/288). Tole-Berkel Pty. Ltd., £394/19/-.

Drilling Machine (C4/313/195). Demco Machinery Co. Pty. Ltd., £683/12/3.

Surfacing and Screwcutting Lathe (C4/313/195). Gilbert Lodge & Co., £1,329/12/-; McPherson's Ltd., £1,380/3/9.

Toolroom Lathe (C4/313/195). Demco Machinery Co. Pty. Ltd., £940/2/6.

Spindle Surface Grinder (C4/313/201). McPherson's Ltd., £3,287.

Machines, Stem Cleaning, portable, "Kerrick" model (File No.

50/3037). Westcott, Hazell Eng. & Steel Ltd., £7,035.

Repair and Modify of Aldis Lanterns (File No. 50/1412). Precision Engineering Pty. Ltd., £1,870/11/-.

Elect. Vegetable Peeling Machine, "Economee" (File No. 50/2679). Tallents & Knapman Pty. Ltd., £221/7/9.

Peelers, Potato, "Economee" Model (File No. 50/3023). Tallents & Knapman Pty. Ltd., £889/5/3.

Terminal Units (File No. 50/3025). Plated Products, £712/17/6.

Late Open Tenders

COMMONWEALTH

**DEPARTMENT OF CIVIL
AVIATION.**

Electric Circuit Breakers (Sch. 309). Oct. 10.

Instrument Current Transformers and Meters, for Switchboards (Sch. 306). Oct. 10.

**DEPARTMENT OF WORKS
AND HOUSING.**

2 Plate Electric Stoves (1,000), for Canberra. Nov. 21.

Compressed Air System, for Finbury. Oct. 17.

NEW SOUTH WALES

**DEPARTMENT OF PUBLIC
WORKS.**

Drifter Drills. Oct. 27.

Exhaust Fans. Oct. 25.

Galvanised Iron Sinks. Oct. 25.

Light Rowing Skiff. Oct. 25.

Pedestal Grinding Machines. Oct. 25.

Portable Electric Drills. Oct. 25.

Rabbit Wire (1 1/2 in. mesh). Oct. 27.

Tool Bags. Oct. 27.

Wire Mesh and M.S. Frame Screen. Oct. 25.

Wood Boring Machines. Oct. 25.

DEPARTMENT OF SUPPLY.

Aluminium Frying Pans. Oct. 20.

Blue Drill, 154,750 yds., 6 1/2 oz. Oct. 24.

Penetrating Oil. Oct. 24.

Photographic Equipment. Oct. 20.

Revolving Clear Vision Screens. Oct. 20.

(Turn to page 88.)

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LATE OPEN TENDERS—Contd

Steel Filing Cabinets and Cup-
boards. Oct. 24.

GOVERNMENT RAILWAYS DEPARTMENT.

Overhead Wiring Equipment,
for the Electrification of Rail-
ways Tracks. Jan. 24.

Span Riveted Steel Through
Girder Railway Bridges, 80 ft. (3).
Nov. 1.

METROPOLITAN WATER, SEWERAGE AND DRAINAGE BOARD.

Pneumatic-tyred Mobile Cranes
(2), new or second-hand (P.T. 375).
Nov. 28.

Steel Wire Rope, for Cableway,
(2-3) in. circ., approx. 7,500 ft.; 2-
3 in. circ., approx. 6,500 ft.; 2-2½ in.
circ., approx. 3,400 ft., (Quot.
8144). Nov. 6.

VICTORIA

GOVERNMENT RAILWAYS DEPARTMENT.

Anode Lead Wall Bushing Insu-
lators. Nov. 1.

Centrifugal Sand Pump. Nov.
1.

Oil-fired Furnace. Oct. 25.

QUEENSLAND

STATE STORES BOARD.

Pipes, Asbestos Cement (Ten-
der A147). Oct. 23.

BRISBANE CITY COUNCIL.

Portable Sand Blasting Machine.
Oct. 18.

Steel Sheet Piling (645 tons),
for Tennyson Power House. Oct.
20.

MISCELLANEOUS.

Cables, Insulators, Lighting
Arresters, House Service Cutouts,
Meters, Switchgear, for Goondi-
windi Town Council (Contract 24/
50). Oct. 17.

Fork End Loader (Spec. 199/50),
for Townsville Regional Electricity
Board. Nov. 6.

SOUTH AUSTRALIA

DISTRICT CONTRACT BOARD.

Receiving Consoles (6); Trans-
mitting Consoles (6). Oct. 19.

Accumulators, various. Oct. 24.

SUPPLY AND TENDER BOARD.

Coal Grabs (2), for Adelaide.
Oct. 30.

WEST AUSTRALIA

GOVERNMENT TENDER BOARD.

Cast Manganese Steel Railway
Crossings. Dec. 21.

Mobile Crane, Wheel Mounted.
Dec. 14.

Railway Wagon Equipment.
Dec. 7.

Telephone Exchange, automatic.
Dec. 14.

DEPARTMENT OF RAILWAYS— NEW SOUTH WALES.

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for impurities; determination of particle size.

OILS, PAINTS, VARNISHES.

Determinations of gum in cylinder oils and brake fluids. **Identification** of oils, waxes and resins. **Tests** of solvents, resins, siccatives, plasticizers, for composition and quality. **Detection** of mineral adulteration of vegetable and edible oils.

SOAP.

Identification of colouring substances, perfumes and components. **Differentiation** between palm oil and tallow soaps. **Tests** of conserving qualities.

RUBBER.

Differentiation: Crude from vulcanised rubbers. **Grading** fillers for purity and determination of loadings in finished products.

BUILDING AND ROAD MATERIALS.

Identification of tar in bitumen. **Examination** of slag cements, of pigmented cements; of the weathering of rocks. **Investigations** of fluid penetration. **Detection** of adulteration or substitution of mastic asphalt.

CHEMICALS.

Differentiation between organic com-



pounds and similar chemical constitutions. Of plant-chlorophyll from chemical chlorophyll. Between para, ortho, and meta derivatives.

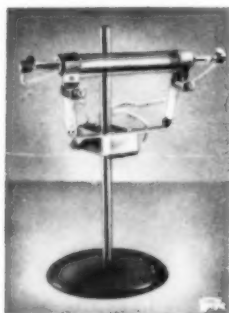
Detection of organic compounds in mixtures; of ring systems and of quinonoid bonds; of radicals -OH, -OCH₃, -CH₃, -NH₂, -CN, etc.

Estimations of purity. **Identification** of colouring matters. **Examination** of essential oils.

Determinations of Vitamin B.

METALLURGY.

Identification of minerals, bitumens, etc. **Differentiation:** Ores of different origin. Torbanite from cannel, etc.



THE HANOVIA U.V. S.500 ULTRA-VIOLET TECHNICAL LAMP

This lamp produces a high output of ultra-violet rays for technical and scientific purposes. It can be used for many applications requiring the characteristic high-pressure mercury arc spectrum. In industry, the U.V. S.500 lamp finds wide use for ageing and fading tests, and is of special interest to:

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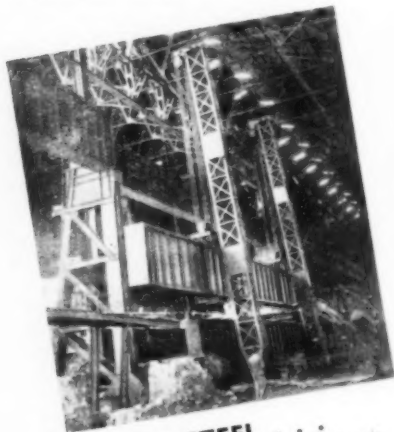
Australia Tomorrow!

HERE'S present activity for future progress in the steel industry. The pictures tell the story, in part, of the industry's great developmental and expansion projects at Port Kembla, New South Wales.

At the Australian Iron & Steel Ltd. Kembla Works, and at the Company's South Coast Collieries, work is proceeding steadily on a balanced programme of construction, the main items of which include:

- Development of new completely mechanised collieries;
- Doubling of coke oven capacity;
- A third blast furnace;
- Two new open hearth furnaces;
- Hot and cold strip mills and tinplate plant.

Completion of this programme will increase the Australian industry's annual steel capacity from 1,750,000 tons to 2,300,000, and will make Port Kembla one of the world's most modern and comprehensive steel-producing centres.



MORE STEEL . . .
Here, a 110 ft. girder weighing 141 tons is shown being raised into position by 75 ft. lifting masts at the open hearth plant whose enlargement will raise Kembla's weekly steel-making capacity to 25,000 tons.

OPPORTUNITY! The steel industry's expansion can mean opportunity for you either in a professional or tradesman's capacity, or as a member of the industry's employee training scheme. You are invited to write to the Company for further particulars of the wide range of employment opportunities available.



MORE IRON: Progress of construction of Kembla's No. 3 blast furnace. With a capacity of 1,500 tons of iron per day, this furnace will rank with the world's biggest and help to meet the demand for more iron created by the enlargement of Kembla's steel making facilities.



COLLIERY DEVELOPMENT: Shown above is the conveyor belt system by which coal won from the A.I.S. Nebo Colliery is transferred from the Bradford breaker building (where it is crushed to the size required for coke making) to the 2,000 ton loading bin (in left background).



MORE HOMES: Situated on the shores of Lake Illawarra, these two, three and four-bedroom brick homes are indicative of the efforts being made by the N.S.W. Housing Commission to provide dwellings at Port Kembla.

AUSTRALIAN IRON & STEEL LIMITED

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